A COMPARITIVE STUDY BETWEEN PLACENTAL EXTRACT VERSUS SILVER SULFADIAZINE IN 20– 40 % FRESH FLAME BURNS AND SCALDS

Dissertation submitted in partial fulfilment of regulation for

The Award of M.S. Degree in General Surgery (Branch I)

THE TAMILNADU

DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI- APRIL, 2013.

COIMBATORE MEDICAL COLLEGE HOSPITAL

CERTIFICATE

This is to certify that this is the bonafide dissertation done by **Dr. Dhanaraj P**. and submitted in partial fulfilment of the requirements for the Degree of M**. S. General Surgery**, Branch I of The Tamilnadu Dr .M .G .R. Medical University, Chennai.

Date :

Professor and Chief
Surgical Unit-VI

Date :

Professor and Head
Department of Surgery

Date :

DEAN
Coimbatore Medical College
Coimbatore.

DECLARATION

I solemnly declare that the dissertation titled **" A Comparative Study between placental extract versus silver sulfadiazine in 20 – 40% fresh flame burns and scalds "** at **Coimbatore Medical College Hospital** was done by me from January 2011 to August 2012 under the guidance and supervision of Professor **DR .G. RAVINDRAN, M.S.,** This dissertation is submitted to the **Tamilnadu Dr . M. G. R. Medical University** towards the partial fulfilment of the requirement for the award of M.S Degree in General Surgery (Branch I).

Place: Coimbatore DR. P. DHANARAJ

Date :

ACKNOWLEDGEMENT

I thank **Dr. VIMALA M.D,** Dean, Coimbatore Medical College and Hospital, Coimbatore for having allowed me to do this study in this Hospital.

I am immensely thankful to Prof. **Dr**. **P.V. VASANTHAKUMAR M.S.,** Professor and Head of the department of surgery for his excellent guidance in conducting this study.

I take this opportunity to express my deep gratitude to my beloved chief, Prof. **Dr. G. RAVINDRAN M.S.,** Professor of surgery whose guidance and criticism have seen me through this study.

I would also like to express my thanks to all other Unit Chiefs

Prof. **Dr. V. ELANGO M.S,** Prof. **Dr. P. SWAMINATHAN M.S,**

Prof. **Dr. D. N. RENGANATHAN M.S,** Prof. **Dr. S. NATARAJAN M.S,**

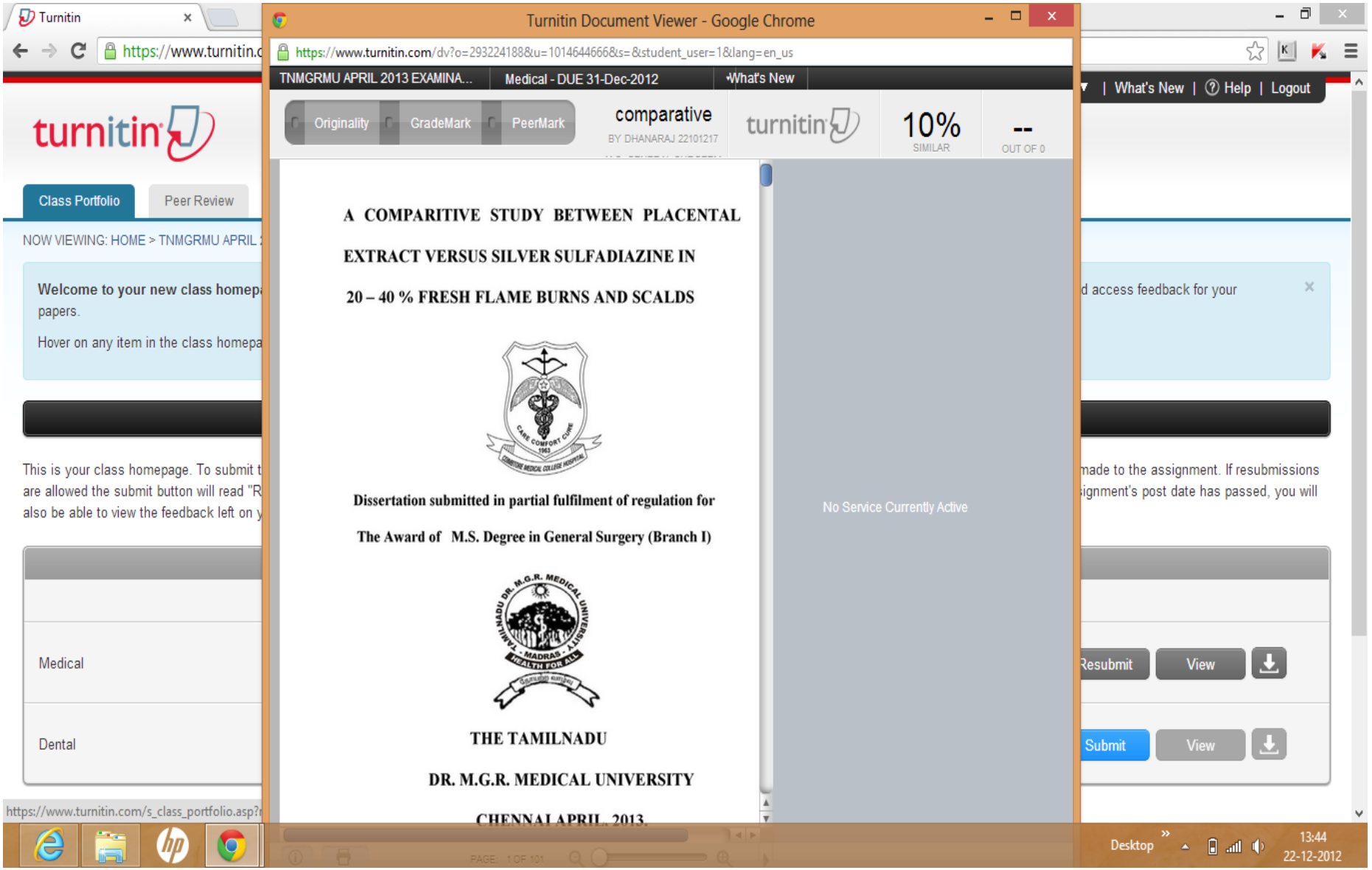
for extending their full support and allowing me to use their patient in this study.

I do convey my sincere thanks to our unit Assistant Professors

Dr. G.VISWANATHAN M.S, and Dr**. S. MUTHULAKSHMI M.S,** for their advice and guidance.

I would also like to extend my heartfelt gratitude to all the assistant professors for all the valuable support and guidance they extended to me.

I thank all the patients whose patience and co-operation has made this work possible.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INTRODUCTION

- Around the world burns are a major cause of health problems as the problem lies not only with the immediate cause but as the patient survives he has to carry the physical and psychological morbidity associated with it.
- 95% of deaths due to burns have been reported in middle and low socioeconomic countries.
- Ever since man had found out about fire, burn injuries have existed the earliest documentary evidence seen in the Ebers Papyrus.
- Since then various people have proposed several different methods to treat burn injuries.
- Susrutha of India during ancient times had classified and described Burns into four categories .He also used honey as antiseptic to treat burn wounds.
- Dupuytren, the famous French surgeon wrote at the beginning of the 19th century that “burns had been the object of one of the most bizarre treatment methods”.
- The Egyptian’s treated burns by incantations and a mixture of gum, goat’s hair and milk from women who had given birth to child.
- Chinese and Japanese used extract of tea leaves.
- Hippocrates suggested the use of warm vinegar and solution of oak bark.

- Celsus described use of honey and Galen prescribed vinegar.
- Rhazes used ice cold water
- Humans have always depended on fire either to prepare food or for warmth , but fire being a double edged sword is associated with injuries which have been one of the earthly evils. So it is this fire which is both blessing and scourge to mankind.

- Burns are tissue injuries resulting from direct contact with flames, hot liquids, chemicals, and electricity or radiation .Most commonly skin is injured.
- Skin loses its function as a barrier to injury and infection and as a regulator of temperature, fluid loss and sensation.
- Pathologically burn injury causes coagulative necrosis to tissues.
- Rarely, burn injures the deeper tissues and vascular structures.
  - Heat is transferred to the tissues by conduction from contact with hot liquids and solids and convection of hot gases over the skin.

    (Flame, radiation) or from a sudden release of great energy as in electric arc or explosion.
  - Burn injury carried a poor prognosis in the past.
  - With the understanding of the patho physiology and advances in fluid resuscitation and early excision of the burns wound, survival of the patient improved in recent times.

- Management of burns is done in two stages

  1)Immediate management

  2)Late management

  - Immediate
    - Fluid resuscitation,
    - Administering antibiotics,
    - Applying dressing to the wound

  - Late
    - Removal of dead tissue, escharotomy and skin grafting.

ANATOMY AND PHYSIOLOGY OF SKIN

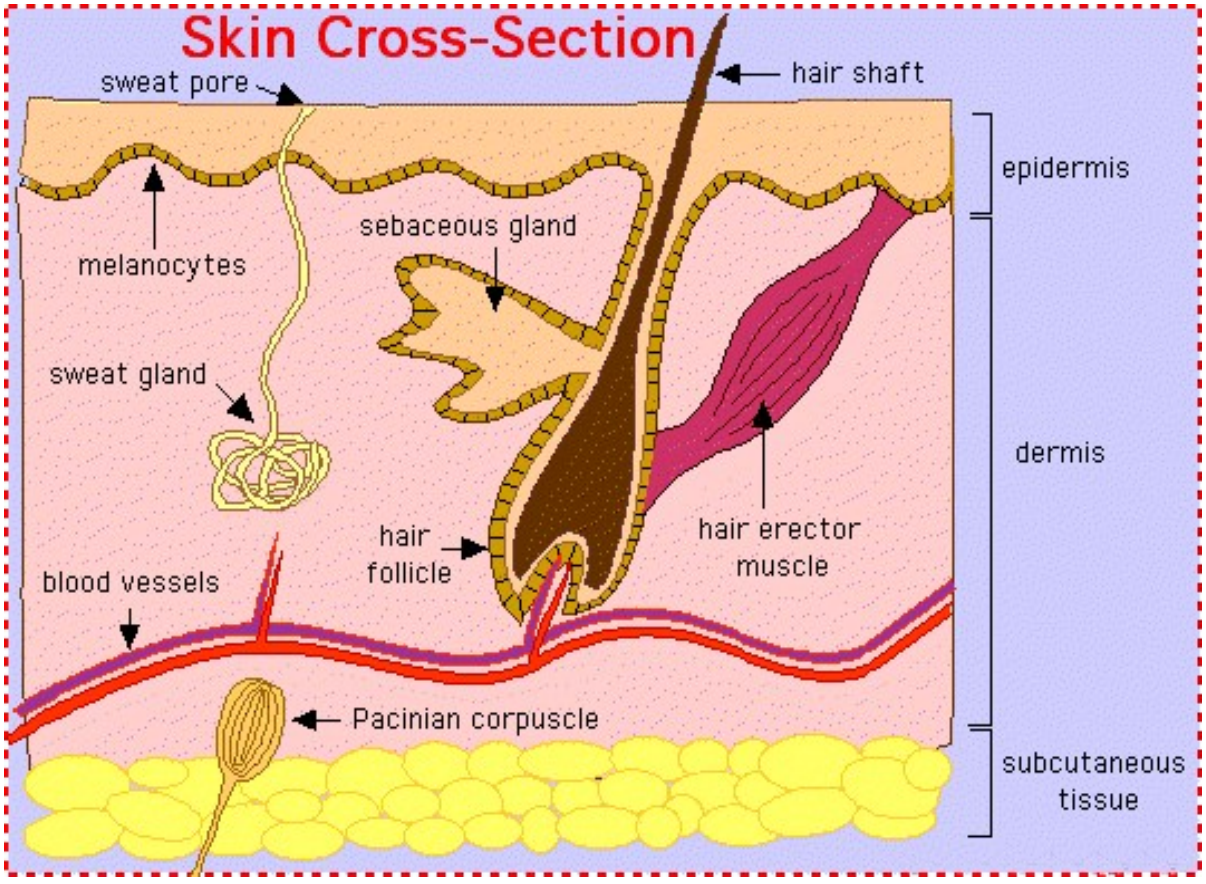
SKIN: - The affected organ.

- Largest organ of the body[1]
- Skin makes up about 15% of total body weight
- The skin is the organ which is directly affected in burn injuries.

It consists of two major layers[1].

Epidermis

Dermis



Epidermis:

- The epidermis, a stratified squamous epithelium, is the outermost layer.
- Normal turnover time of epidermis is 28 days.[1]
- It is predominantly composed of keratinocytes (90%).[2]
- Remaining 10% of epidermal cells are[2]
    - Langerhans cells
    - Melanocytes
    - Merkel cells
- Proliferative compartment resides in the basal layer .
- The epidermis is very thick over the soles of the feet, and it is very thin over the ears.
- Keratinized layer forms a protective seal between the organism and the environment, protecting the skin from invasion by bacteria and other foreign agents and it also prevents excessive loss of essential body fluids.

The epidermis has five layers:

Stratum corneum or corny layer [2]

- It is formed of Horny cells which are the largest cells of the epidermis made up of dead, mature skin cells called keratinocytes.

- These cells are constantly replaced by cells from the basal layers of the epidermis.

Stratum lucidum

- This layer found only in thicker skin and helps to reduce friction between the corny layer and the granular layer.
- The skin is thicker in some areas (like the soles of feet) and thinner in others; women also tend to have thinner skin than men do.

Granular layer or Stratum granulosum

- The most apparent structures within these cells are basophilic keratino hyaline granules.
- This layer is characterized by build-up of components necessary for the process of programmed cell death and formation of a superficial water impermeable barrier.

Spinous layer or Stratum spinosum

- This layer named for the spine like appearance of the cell margins in histology.
- These spines are abundant desmosomes, calcium dependant cell surface modification that promote adhesion of epidermal cells and resistance to mechanical stresses.

Basal layer or stratum germinativum or Stratum basale

- Deep most layer of epidermis.
- This layer is attached to basement membrane.
- It contains mitotically active keratinocytes and gives rise to superficial layer.
- Malphigian layer includes both basal and spinous layer.

Basement membrane

- It acts as an anchor for the epidermis.
- It allows movement of cells and nutrients between the dermis and epidermis.
- The cell membrane of the epidermal basal cell is attached to the basement membrane via hemidesmosomes.
- Lamina densa of basement membrane consists of type – IV collagen.

Dermis:

- The dermis is vascular and supports the epidermis structurally and nutritionally.
- This layer is also where the vasculature and nerves live.
- It varies in thickness.

- The dermis consists of fibres including collagens I and collagen III, elastin and reticulin are synthesised by fibroblasts.
- Support is provided by ground substances like glycosaminoglycans, hyaluronic acid and dermatan sulphate.
- Depends on the pattern of collagen fibrils, superficial part of dermis is known as the 'papillary dermis.
- Deeper and coarser part as the 'reticular dermis'.[3]
- Cutaneous layer is formed by epidermis and dermis.
- Blood vessels, nerves, sweat glands, and hair follicles are found in dermis.

Functions of skin[2]

Major functions of skin are

- Protection against disease causing particles.
- Response to Sensory stimuli.
- Vitamin D formation.
- Exchange of waste.
- Thermoregulation

WOUND HEALING

- Repair and regeneration after injury of the tissue are fundamental defence mechanism of the body.
- Totipotent cells are required for regeneration of multiple germ layers.
- In a human outer and inner body coverings of epithelial layer retain regenerative property.
- Skin, GIT, respiratory and urinary epithelial layer having the regenerative capacity after wounding.
- Factors affecting wound healing[4, 5]
    - ❖ General factors
        - Old age – wound healing delayed.
        - Smoking – wound healing delayed.
        - Obesity
        - Vitamin deficiency

          Vitamin c deficiency delays wound healing by defective collagen production.
        - Malnutrition- delays wound healing due to defective immunity.
        - Anaemia

- Uraemia
- Diabetes
- Jaundice
- Immunosuppressive drugs like steroids and cytotoxic drugs.
- HIV disease.
- Other immunosuppressive drugs.

❖ Local factors

- Persistent and recurrent trauma.
- Infection in local area.
- Presence of foreign body and unhealthy necrotic tissue.
- Prolonged venous and lymph stasis.
- Large size of wound.
- Hematoma collection.
- Tissues under tension.
- Irradiation.
- Dirty wounds.

TYPES OF WOUND HEALING[7]

- Healing by primary intention
- Secondary intention

- **Primary healing**
  - It is seen in clean incised wound and surgical wound when wound edges are closely approximated.
  - Epithelial regeneration occurs more than fibrosis in this type of healing.
  - Scar will be linear and smooth.
- **Secondary healing**
  - This type of healing occurs when there is extensive loss of tissue as in major trauma , burn injury and sepsis.
  - Wound heals slowly.
  - Healing occurs with the formation of fibrosis , which results in formation of wide scar.
- **Stages of wound healing[6]**
  - **Stage of inflammation or lag phase or exudative phase**

- Begins immediately and it lasts for 4-6 days.
- Signs of inflammation - rubor ,tumour, color and dolor are seen.
- Microscopic changes - Neutrophils appear after 48 hours which secrete mediators for inflammation and also secrete bactericidal free radicals.
- Chemical mediators involved and their actions are[8]

Monocyte chemotaxis	Chemokines, TNF, PDGF, FGF, TGF-β
Fibroblast migration/replication	PDGF, EGF, FGF, TGF-β, TNF, IL-1
Keratinocyte replication	HB-EGF, FGF-7, HGF
Angiogenesis	VEGF, angiopoietins, FGF
Collagen synthesis	TGF-β, PDGF
Collagenase secretion	PDGF, FGF, TNF; TGF-β inhibits

HB-EGF, heparin-binding EGF; IL-1, interleukin 1; TNF, tumour necrosis factor

❖ **Proliferative phase or fibroblastic phase or collagenase phase**

- This phase begins in 1st week and lasts for 6 weeks.
- Collagen and ground substance like glycosaminoglycans are produced by fibroblasts .
- Collagen fibrils are produced by aggregation of tropocollagen which in turn formed by hydroxylation of proline and lysine.
- 90% of final strength is gained in 1 month.

❖ **Remodelling phase or maturation phase**

- Begins in 6 weeks and lasts for 2 yrs.
- Cross linking of immature collagen fibrils leads to formation of mature collagen.
- The mature collagen is reason for tensile strength of the scar.

❖ **Wound contraction**

- It is an active process which occurs earlier and boosts secondary healing.
- Contractile myofibroblasts appear in granulation tissue and cause rapid decrease in the size of large wounds.
- Contraction of wound facilitates secondary healing and improves the functional as well as cosmetic results.

TYPES OF BURN

- Scalds
- Flame burns
- Flash burns
- Contact burns
- Electrical burns
- Chemical burns
- Radiation burns

SPECIALIZED BURNS UNIT [25]

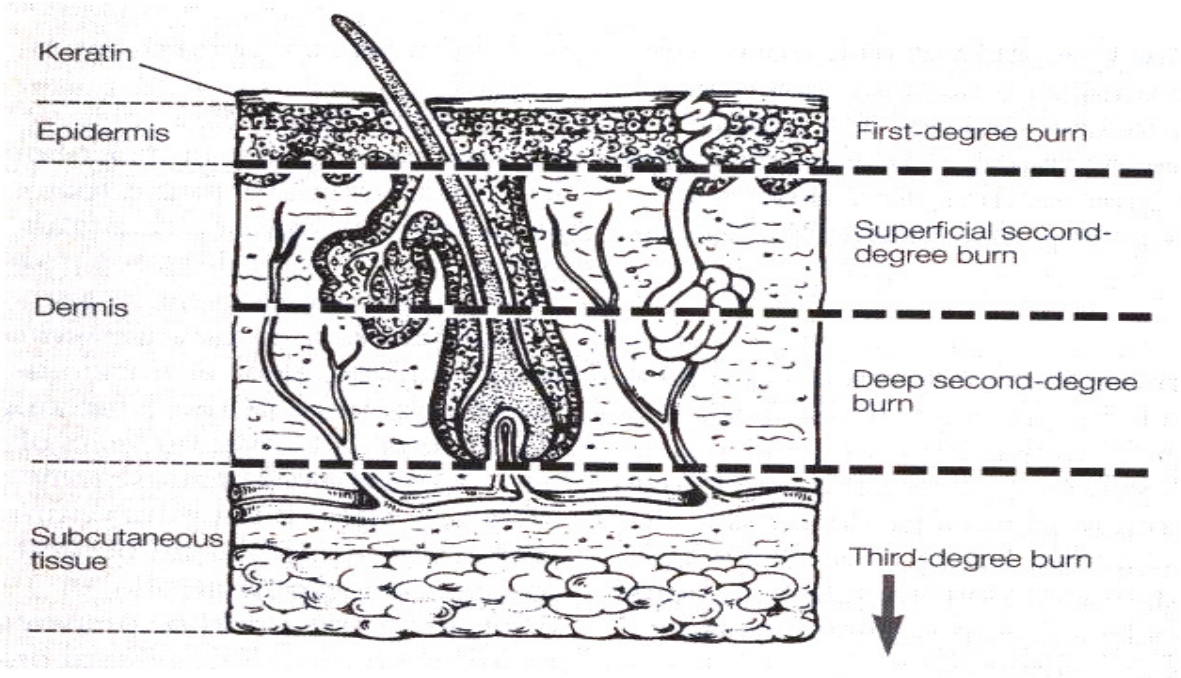
- Improvements in burn care originated in specialized units specifically dedicated to the care of burned patients.
- These units consists of experienced personnel with resources to increases the outcome from these severe injuries.
- This unit consists of
    - Qualified and experienced Burn's surgeon.
    - Dedicated and well trained nurses.
    - Physical and occupational therapist.
    - Dedicated Social workers.
    - Well experienced Dieticians.
    - Experienced Pharmacists.
    - Respiratory therapists.
    - Psychiatrists and Prosthetists.
- Because of these available resources, patients with burns are best treated in these units.

The American burns association has given the criteria's for transfer of a patient to a regional **specialized burn centre[25].** They are

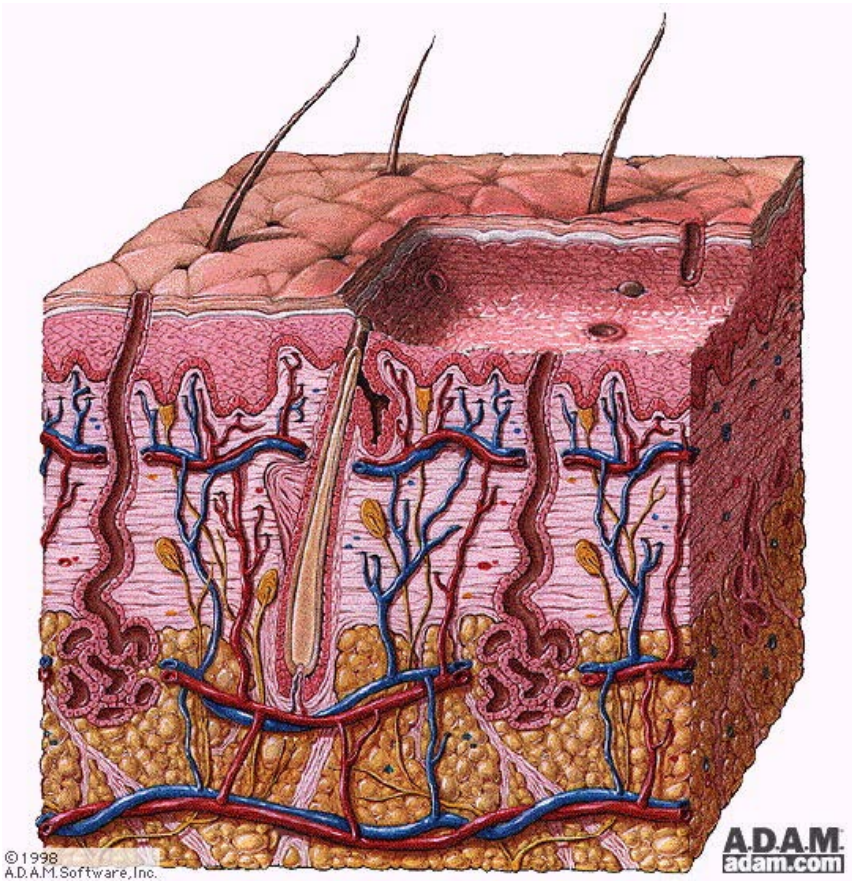
- Patients with Partial- thickness burns greater than 10% Total body surface area.
- Burns involving special areas of body such as face, hands, feet, genitalia, perineum and major joints.
- Electrical burns and lightning injury.
- Chemical burns.
- Inhalation injury.
- Burns which occur in patients with pre- existing medical disorders.
- Patients with burns and associated traumatic injuries in which the burn is the greatest risk.
- Burns in children without qualified personnel for the care of children in hospital.
- Patients with burns ,who will require special social, emotional or rehabilitative intervention.

CLASSIFICATION OF BURNS[6,12,18,19]

Depending on thickness of skin involved



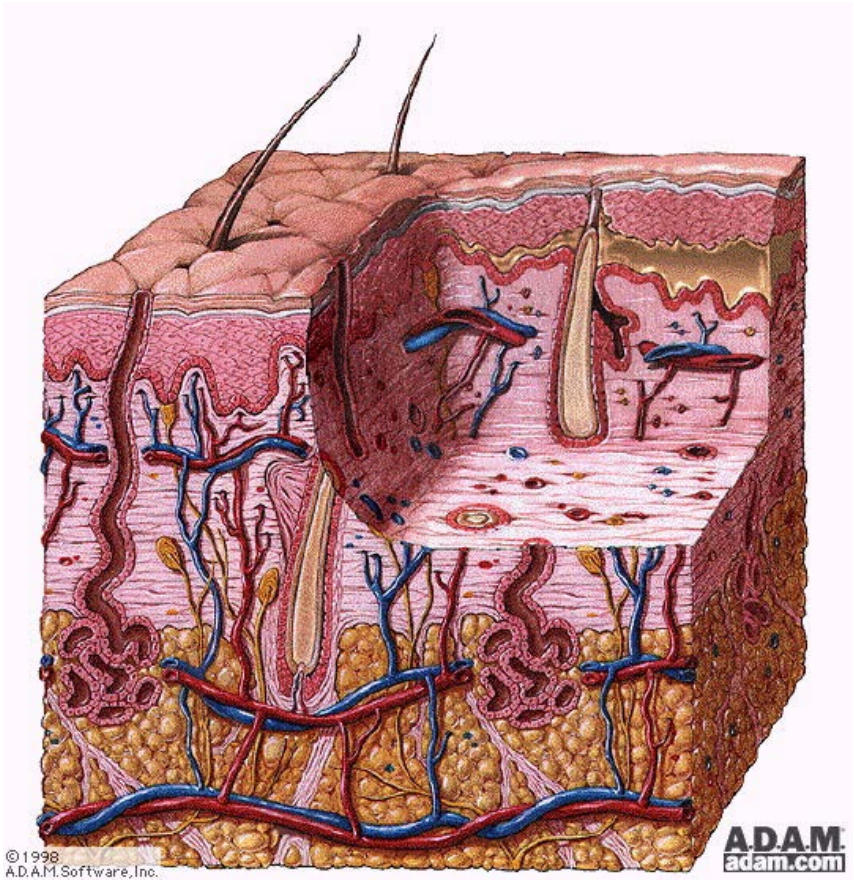
a. **First degree:** Here the epidermis looks red and painful, no blisters, heals rapidly in 5-7 days by epithelialisation without scarring.



b. **Second degree:** The affected area is mottled, red, painful, with blisters, heals by epithelialisation in 14-21 days.

- Superficial second degree burn heals, causing pigmentation

- Deep second degree burn heals, causing scarring, and pigmentation



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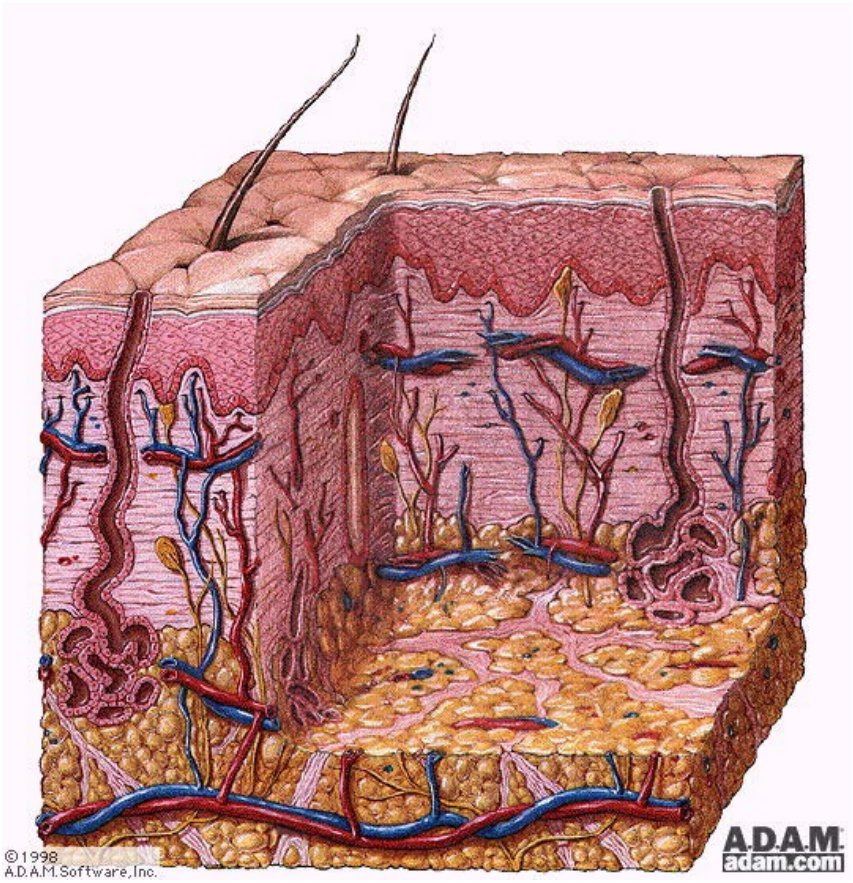
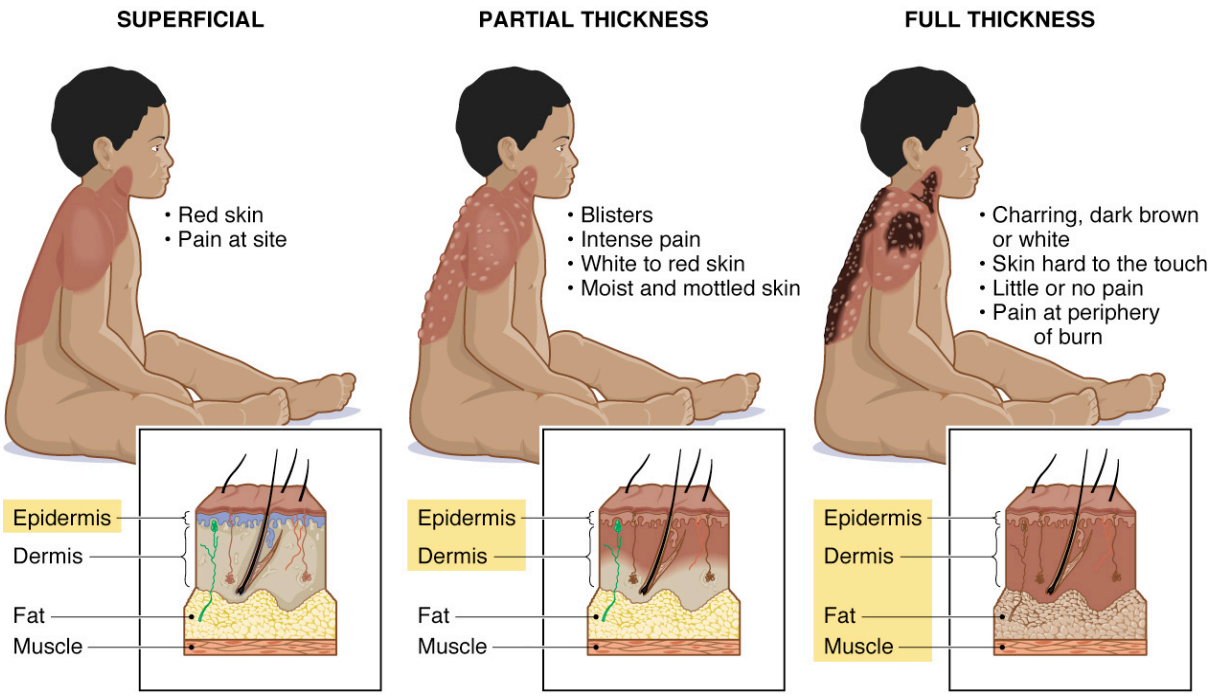
c. **Third degree:** The affected area is charred, parchment like, painless and insensitive, with thrombosis of superficial vessels. It requires grafting. Charred, denatured, insensitive, contracted full thickness burn is called as eschar. These wound must heal by reepithelialisation from wound edge.



d. Fourth degree: involves the underlying tissues, muscles and bones.

	Involved area	Pain	Adnexa	Appearance	Healing
1^0 burn	Epidermis	+	+	Erythema / oedema	3-5 days
2^0 burn	Dermis	++	+	Blister, soft waxy white	10 – 20 days with hypertrophic scar
3^0 burn	Full thickness	__	Lost	Tough, Dry,Eschr	3-5weeks, eschar separate, healing with SSG



a. **Partial thickness burns:** it is either first or second degree burn which is red and painful, often with blisters.

b. **Full thickness burns:** it is third degree burns which are charred, insensitive, and deep involving all layers of the skin.

Depending on the percentage of burns

Mild

- Partial thickness burns < 15% in adult or < 10% in children
- Full thickness burns less than 2%

Moderate

- Second degree of 15 – 25% burns (10-20% in children)
- Third degree between 2 – 10% burns

- Burns which are not involving eyes, ears, face, hand, feet, perineum

Severe

- Second degree burns more than 25% in adults, in children more than 20%
- All third degree burns of 10% or more
- Burns involving eyes, ears, feet, hands, perineum.
- All inhalation and electrical burns

Burns with fractures or major mechanical trauma

PATHOPHYSIOLOGY OF BURNS [8,9,10,16]

- The degree and extent of injury will be determined by the temperature and magnitude of the burning agent and also by the duration of exposure of the offending agent.
- Cellular injury begins at or above 44^0C.
- Thermal injury can cause damage to capillary endothelium.
- All burns leads to capillary damage and this is the cause of very large fluid loss that occur immediately after burns.
- The RBCs are retained in the circulation, though they may be sequestrated by local stasis.
- Because of this the peripheral resistance is increased, cardiac output is decreased due to reduction in the blood volume, thereby the viscosity of the blood is increased.
- Loss of red blood cells associated only with deep burns.
- The loss of red blood cells occurs in three distinct phases, which will not exceed 10% of total cell volume.
    - Actual destruction of RBCs by heat at the time of burning.
    - Becoming abnormally fragile and removed by the reticulo endothelial cells .
    - Unknown mechanism.

- Electrolyte changes

  The large volumes of fluid which move from one compartment to another in burns shock are associated with corresponding shifts of electrolytes.

- Cytological damage

  1) Protein denatured.
  2) Thermo labile enzyme system blocked.
  3) Cell death occurs.

- Inflammatory responses
  - Accumulation of fluid in the wound.
  - Following mediators are released.
    - Thromboxanes
    - Vasoactive amines
    - Leukotrienes
    - Oxygen radicals
    - Lymphokines
  - Spasm of venules.
  - Vasoconstriction of arterioles.
  - Dilatation of capillaries.
  - Leakage of fluids, electrolytes and proteins.

- Burns shock

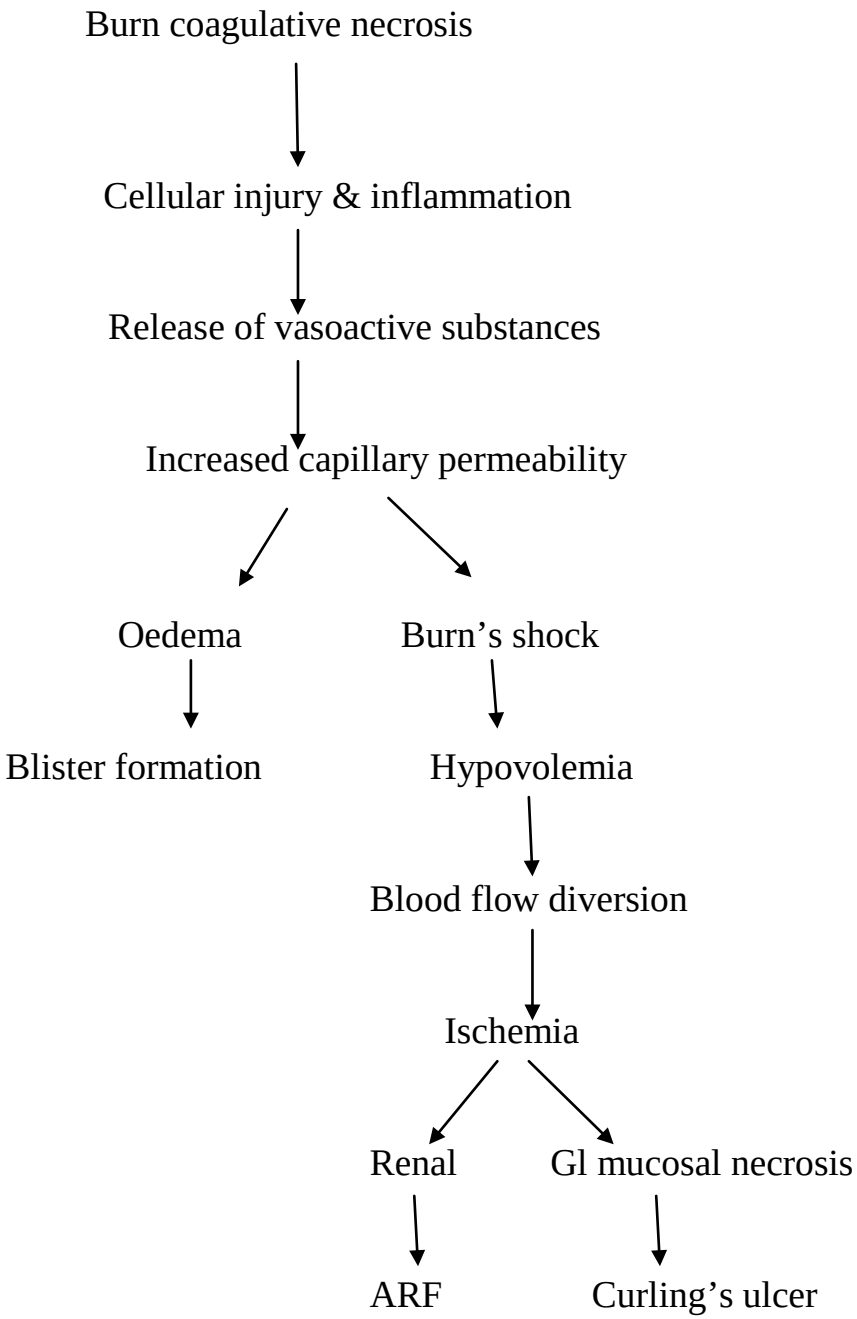
  It is due to

  - Increased capillary permeability
  - Increased fluid sequestration
  - Increased water loss
  - RBC's are destroyed

- Burn shock is the state of organ hypo perfusion in immediate post burn period because of lack of circulating volume.
- Water loss is due to destruction of epidermis; occurs in acute and post resuscitation period.
- Greatest initial volume loss is into interstitial space causing

  Oedema, haematuria, renal shut down and ARDS.
- Loss of capillary integrity mostly seen in first few hours.

PATHOPHYSIOLOGY

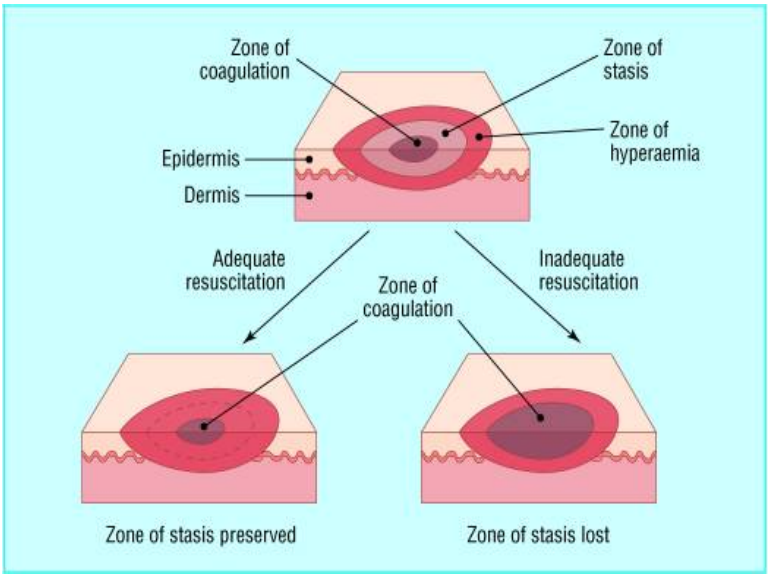


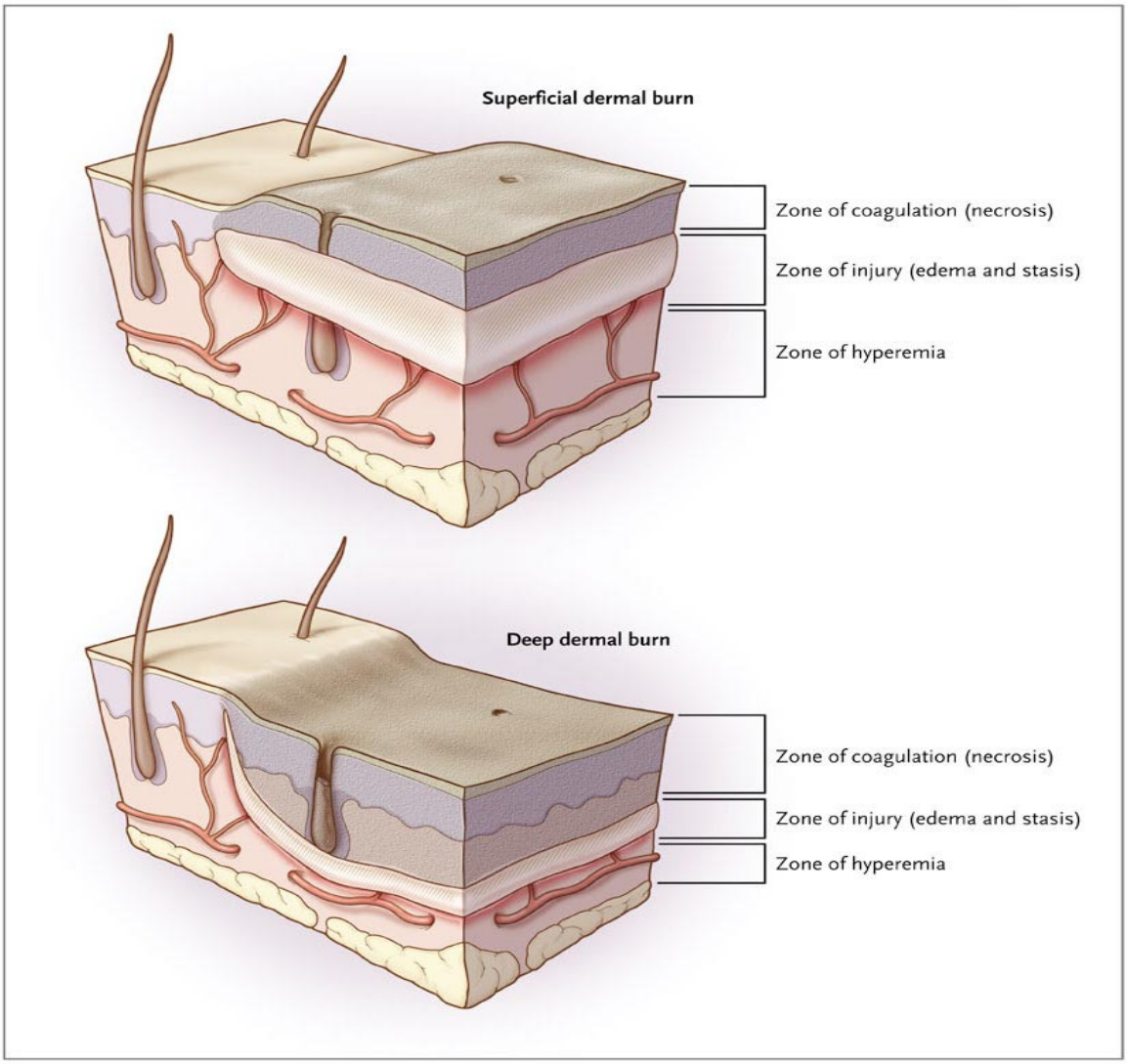
Burn injuries can cause systemic as well as local changes.

LOCAL CHANGES

There are 3 zones noted in burned tissue

- **Central zone of ischemia or coagulation**
  - Severe damage to tissues
  - Cells are destroyed by coagulation of its proteins
- **Zone of stasis or oedema**
  - These are injured cells adjacent to central zone
  - These cells will die within 24 – 48 hours
- **Zone of hyperaemia**
  - This is zone of minimal injury
  - This will recover within 7 days
  - Perfusion of tissue is increased




Superficial dermal burn
Zone of coagulation (necrosis)
Zone of injury (edema and stasis)
Zone of hyperemia
Deep dermal burn
Zone of coagulation (necrosis)
Zone of injury (edema and stasis)
Zone of hyperemia

ASSESSMENT AND MANAGEMENT OF BURNS [17,18,19,21,23,24,25]

INITIAL MANAGEMENT

PRE HOSPITAL

- Burned patients must be removed immediately from the source of injury and the burning process should be stopped.
- Inhalation injury is always suspected and 100% oxygen given to the patient by facemask.
- All caregivers to the patients should use universal precautions

  Including wearing gloves, aprons, face mask and protective eyewear like goggles whenever contact with the patient blood or the body fluids.
- Burning clothes are removed as soon as possible.
- Clean water of room temperature can be poured on the wound

within 15 minutes of injury to decrease the depth of the wound.

INITIAL ASSESSMENT

- Initial assessment of a burned patient is divided into a primary and secondary survey.
- During primary survey, immediately life threatening conditions are quickly identified and treated.
- During secondary survey, a more thorough head to foot evaluation of the patient to be done.

- Direct injury to the upper airway results in oedema, which together with the generalized whole body oedema associated with severe burns may have obstruction of the airway.
- Airway injury must be suspected always with facial burns, singed nasal hairs, carbonaceous sputum and tachypnoea.
- Progressive hoarseness is an early sign of impending airway obstruction and endotracheal intubation needs to be done before oedema distorts and obstruct the upper airway.
- The chest is completely exposed in order to assess breathing.
- Blood pressure may be difficult to measure in burns patients due to oedematous extremities.
- The pulse rate can be used as an indirect measure of circulatory volume.
- In patients who have been in an explosion may have the possibility of spinal cord injury they must be given cervical spine stabilization.

PRE HOSPITAL WOUND CARE

- Patient is wrapped in a blanket to minimize heat loss and for temperature control.
- Burn wound requires protection from the environment with application of a clean dry dressing.

TRANSPORT

- During transport of a burn victim it is important to have emergency equipment available along with trained personal on board such as nurses, physicians, paramedical personal or respiratory therapists who are familiar and experience in managing multiple injured trauma patients .

DEFINITIVE TREATMENT

- Admit the patient in burns unit.
- Maintain the airway, breathing and circulation.
- Detailed history to be noted regarding patients name, age, sex, place & time of incidence.
- History of present drug intake, chronic medical conditions, previous drug allergy and related injuries to be noted.

Assess the percentage of burns by '**Wallace rule of nine'**

Body parts involved	% of burn
➢ Each upper limb ➢ Each lower limb ➢ Head and neck ➢ Front and back of trunk ➢ Genitalia	➢ 9% of TBSA ➢ 18% of TBSA ➢ 9% of TBSA ➢ 18% Each ➢ 1% of TBSA TBSA- Total body Surface area

- **Depth of burn**
  - Patients with burn wounds are needs to be reassessed in the first 48 -72 hours because depth may increase due to inadequate treatment or secondary infection.
  - Burn wounds can be superficial in some areas and deeper in other areas.
  - Keep the patient in clean room.
  - Burns unit is ideally air conditioned with barrier nursing, sterile clothes, bed sheets with all aseptic methods.

- **FLUID RESUSCITATION**

Pathophysiology involved in fluid management

- Burns injury causes an increased capillary leak in initial period leading to loss sodium and protein rich ECF fluid from intravascular compartment into area of burns so loss of sodium and protein rich fluid is at its greatest during the 1st 8 to 12 hrs.
- The rate of loss of fluid and plasma volume decreases substantially by 8 to 24 hrs.

- Proper fluid therapy is important in burns patients because

- Hypovolemia can lead to

- Shock and renal failure

- Rapid conversion of viable deep dermal burn to non viable full thickness burn, which can increase mortality and morbidity .

- Acute loss of protein due to leaky capillaries causes hypoproteinemia, which further increases oedema formation.
- Aggressive fluid therapy can lead to

Massive tissue oedema leading to decrease in tissue perfusion and oxygenation. This may result in further ischemic insult.

- Objective of proper fluid therapy is to

- Restore and maintain adequate tissue perfusion .
- Avoid organ ischemia.
- Minimize the degree of tissue oedema .
- Avoid detrimental effect of over resuscitation.

➢ **Initial fluid resuscitation(1st 24 hrs)**

- Ringers lactate is the most preferred fluid for initial resuscitation because

- Composition of RL is most physiological, so large volume can be used without causing electrolyte derangements.

- RL with a sodium concentration of 130mEq/L replaces large quantity of sodium and water lost from the intravascular space into the burn wound.

- It is free of glucose so safe in view of early glucose intolerance.

- Lactate in RL is converted into bicarbonate which helps in correction of metabolic acidosis, commonly found in burns patients.

- Volume of Hypertonic saline required for initial resuscitation is small as compared to that of RL.

- Increased osmolality of hypertonic saline generates increased osmotic pressure, which shifts intracellular water to fill intravascular volume, and therefore it is effective in treating shock.

- Benefit of hypertonic saline is seen in young patients with more than 50% burns.

- Elderly burns patient with limited cardiac reserve with high risk of developing pulmonary oedema also gets benefited by resuscitation with hypertonic saline in order to decrease total volume of fluid administration.

- Hypertonic saline is used selectively and sparingly because margin of safety is low and it requires extensive monitoring .

- During the use of hypertonic saline serum sodium should not be allowed to exceed 160mOsm/L .

➢ Colloid infusion should be avoided in 1st 24 hrs because

- It is not more effective than crystalloid in restoring the plasma volume during this period. Retention of colloid within circulation is no greater than the equal volume of RL.

- Due to initial profound capillary leak, like circulatory protein even colloids infused will shift into the extravascular space. So it will exacerbate rather than improving the total body oedema.

➢ **Fluid therapy from 24 to 48 hrs**

As the capillary permeability reduces significantly after 24 hrs, the rate of extravascular fluid loss is considerably less than that seen in the 1st 24 hrs. So lesser fluid volume is required in second 24 hrs.

Since burn tissues are saturated with sodium, they do not attract sodium and in turn water. So in the second 24hrs period, as the rule no sodium containing fluid is infused.

Electrolyte-free, 5%-dextrose should be given in an adequate volume to maintain urine output and to provide adequate replacement for maintenance need and to cover evaporative water loss.

Similarly even capillary protein loss is sealed at this stage, so colloids can be given safely to resolve plasma volume and to maintain cardiac output .

The volume of the fluid infused per hour should be roughly reduced by 25 to 50 %.further modification is generally done by closely monitoring the urine output.

- **Fluid therapy after 48hrs.**
  - Fluid requirement after initial 48 hrs of resuscitation is the sum of normal maintenance requirements plus replacement of abnormal losses.(including evaporate water loss and continuous loss of plasma)
  - Maintenance requirement contains chiefly water, sodium (3 mEq/kg) and potassium (2 mEq/kg).
  - Significant evaporate loss occurs from the wound surface at this which contains chiefly water. So to replace this loss salt free solution 5%-dextrose is preferred. Volume required is 1ml/kg/% burns approximately.
  - Plasma loss occurs into burns tissue in deep burns and wound surface in superficial burns, which is replaced by dextrose saline, plasma or albumin with an aim to maintain serum albumin> 2.5 gm/dl.

- Correct anaemia by packed cell infusions maintaining haematocrit >35% .

Formula to calculate the fluid replacement

A) Parkland's formula:

- It is commonly used
- 4ml/%burn/kg body weight/24 hours.
- Maximum percentage considered is 50%.
- 50% the volume is given in first 8 hours, rest given in 16 hours.

B) Muir and Burclay regime:

$$\left.\frac{\%\ \text{burns} \times \text{body weight in kg}}{2}\right\} = 1\ \text{Ration}$$

- 3 rations given in first 12 hours
- 2 rations in second 12 hours
- 1 ration given in third 12 hours

C) Galveston regime (Paediatric)

- 500ML / m^2 burned + 1500 ml/m^2 total

D) Modified brookes formula

- First 24 hours;

  RL; 4ml/kg/%burns In 24 hours (first half in first hours)

- Second 24 hours
  - Crystalloids- to maintain urine output

- Colloids -0.3ml to 0.5ml/kg/burns in 24 hrs

d) Evan's formula-

- In first 24 hours-

- Normal saline 1ml/kg/% burns.
- Colloids 1ml/kg/%burns.
- 5% dextrose in water, 2000 ml - adult.

- In second 24 hours

- 50% of the volume used in first 24 hours.
- Urinary catheterization should be done to monitor urine output; 30-50ml/ hour should be the urine output.
- Tetanus prophylaxis should be given.
- **Antibiotics:** Aminoglycosides, penicillin's, cephalosporins and metronidazole.
- **Respiratory management**

➢ Upper airway oedema of the pharynx, epiglottis and vocal cords are evaluated.

➢ If mild oedema is noted, intermittent positive pressure ventilation with bronchodilator may be useful.

➢ If severe laryngeal oedema is seen tracheostomy is recommended

Metabolic and nutritional needs

- Total Kcal needs for a burns patient are based on age, sex, body size and severity of burn.
- **Commonly used Calculation:**

  Kcal = Basal Energy Expenditure + Stress/Injury Factor
- Most widely used formula for estimating Basal energy expenditure is the **Harris Benedict Formula.**
- **Harris Benedict formula for Males:**

  Basal energy expenditure (kcal/day) = 66.47 + (13.75 X Weight) + (5 X Height) - (6.76 X Age)
- **For Females:**

  Basal energy expenditure (kcal/day) = 655.1 + (9.56 X Weight) + (1.85 X Height) - (4.68 X Age)

  Weight = Body weight in kg

  Height = Height in cm

  Age=Actual age in years
- **The stress factors used for burn patients are**

  Up to 20% total burned surface area = 1.0 - 1.5

  20 - 40% TBSA = 1.5 - 1.85

  Greater than 40% TBSA = 1.85 - 2.05

- Another formula used to calculate Basal energy expenditure is **Curreri Formula**:

  (25 kcal X body wt in kg) + (40 X % total body surface area burned)
- The maximum of TBSA is limited to 50%.
- **Overfeeding** can be as dangerous as underfeeding.
- Complications of overfeeding are:
  - Hyperglycaemia
  - Hyperosmolality (lead to osmotic diuresis, dehydration, and ketotic acidosis), and hepatic steatosis.
- To over the negative nitrogen balance with major burn during the first month post injury and approximately 20gms.
- Nitrogen /m^2 per day during 2^{nd} month 15gms must be given.
- Vitamin supplementation and fat must be provided as follows
  - 1gm of ascorbic acid
  - 50mg of thiamine
  - 50mg of riboflavin
  - 500mg of nicotinamide
  - Twice the daily requirement of vitamin A&D
  - Multivitamin infusion should be given
  - Blood transfusion given according to haemoglobin level
  - Total Parenteral Nutrition is required for faster recovery

Protecting the gastrointestinal tract

1) The reflex ileus usually subsides by 48 to 72 hrs.

2) Neutralization of gastric contents and maintenance of gastric ph above 7.0 protects against stress ulceration.

3) Intravenous injection of ranitidine 50mg twice daily and liquid antacid 10ml twice daily orally should be given.

4) Ryle's tube insertion initially for aspiration purpose and later for enteral feeding.

- Culture from the wound and total white cell count at regular intervals are essential to identify the sepsis.

Indicators of adequate resuscitation

1	Pulse < 120min
2	B.P >120mm of Hg systolic
3	Urine output 30-50 ml/hr or IMI /kg / hr
4	CVP < 5-10 cm H_2O
5	Clear sensorium
6	Normal PCWP

Causes of failure of resuscitation

1	Efforts are delayed
2	Extent of injury under estimated
3	Associated inhalation injury
4	Third degree or fourth degree/electrical burns
5	Myocardial depression
6	Associated alcoholism/ heart diseases

BASIC INVESTIGATIONS FOR A BURNS PATIENT

- Complete blood count
- Blood grouping and typing
- Blood sugar and urea
- Serum electrolytes
- Pregnancy test in all females of childbearing age.
- Arterial blood gas analysis
- CXR and other X-rays if indicated
- ECG
- Serum proteins

LOCAL MANAGEMENT[26,27,28,29,33,37]

- Initial cooling, cleansing and debridement should be done.
- Determination of wound viability is one of the most difficult.
- Dressing at regular intervals under anaesthesia using paraffin gauze, plastic films, hydrocolloids, Vaseline gauze or biological dressings to be done.
- Open method with application of silver sulfadiazine without dressings can be done.
- In closed method dressing to be done to soothen and to protect the wound to reduce the pain.
- Tangential excision of burn wound with skin grafting can be done within 48 hours in patients with less than 25% burns.
- It is usually done in deep dermal burn.
- Slough excision should be done frequently.
- Most commonly used topical microbial agents are
    - Silver sulfadiazine-1%
    - Mafenide acetate-5%
    - Silver nitrate – 0.5%
- Once the wound granulates well, usually SSG is done in 21 days.
- If there is eschar, escharotomy is required to prevent compression of vasculature to the tissues.

ESCHAR

- It is charred, denatured, full thickness burns with contracted dermis.
- It has no sensation.
- Thrombosed superficial veins are seen.
- Circumferential eschar can cause more oedema which causes both venous as well as arterial compression thereby causing ischemia and gangrene of the distal part.
- Escharatomy
    - Deep longitudinal full thickness incisions are made to prevent the oedema.
    - To protect the vessels getting compression by eschar.
- Pseudoeschar is formed due to repeated silver sulphadiazine application to the burned skin.

COMPLICATIONS OF BURNS

❖ IMMEDIATE COMPLICATIONS

- **Hypovolemic shock**
- **Septicaemia and wound sepsis**
  - The most common complication.
  - If untreated ends fatally.
  - Blood culture and sensitivity to be tested.
  - Antibiotics used according to report.
  - Wound sepsis is an imbalance in the normal equilibrium between bacteria and host resistance.
  - In wound sepsis increase in bacteria level from 10^3 organisms / gram of tissue to abnormal levels of > 10^5/ gram of tissue.
  - Clinical signs of wound sepsis are
    - Hyper or hypothermia
    - Respiratory distress or pulmonary oedema
    - Mental confusion
  - Local signs of wound infection
    - Conversion of second degree burn to full thickness burn.
    - Focal black discoloration of wound.
    - Degeneration of wound with new eschar formation.
    - Unexpectedly rapid eschar separation.
    - Haemorrhagic discoloration of subeschar fat.

- Erythematous and oedematous wound margin.
- Crusted serrations of wound margin.

➢ Histological criteria of burn wound infection

- Dense microbial growth in eschar and subeschar space.
- Haemorrhage in unburned tissue.
- Microbes in unburned tissue.
- Increased inflammatory reaction in adjacent viable tissue.
- Perineural and intralymphatic migration of organisms.
- Vasculitis with perivascular “cuffing” of organisms.
- Small vessel thrombosis of ischemic necrosis of unburned tissue.
- Microbial flora

  - Clostridium tetani
  - Streptococcal infection
  - Pseudomonas

o Duodenal and stomach ulceration

- Superficial gastric erosions are common.
- They are usually multiple in number .
- They may be bleeding from this ulcers.
- True duodenal ulcerations manifest 10 – 14 days after burn injury.
- These ulcers are known as Stress or Curling’s ulcer.
- Erosion in stomach and duodenum.

- Hypoproteinemia
    - Manifests as pedal oedema.
    - Treated with Fresh frozen plasma , astymin infusion and high protein diet.
- Renal failure
    - It can occur in patient with large burn.
- Liver necrosis
- Necrosis of pancreas
- Pulmonary complications
- Cerebral oedema

❖ **INTERMEDIATE COMPLICATIONS**

- Glycosurea and hypoglycaemia
    - Transient glycosuria without ketonuria
    - exacerbation of pre existing diabetes mellitus
- Pseudomonas septicaemia
- Shock lung
- Pneumonia
- Suppurative thrombophlebitis
- Decubitus ulcers
- Constricting eschar
- Pulmonary embolism
- Osteochondritis

❖ LATE COMPLICATIONS

- **Contracture**

A) Complications of contracture

- Ectropion of eyelid causing exposure keratitis and corneal ulcer
- Disfigurement of face
- Restricted opening of mouth due to microstomia
- Limited neck movements
- Hypertrophic scar and keloid formation

B) Treatment for contracture

- Excision and release of contracture surgically and use of skin graft or 'Z' plasty
- Appropriate physiotherapy to be given
- Use of pressure garments

C) Prevention of contracture formation

- Appropriate Joint exercise in full range during recovery period
- Proper use of pressure garments
- Use of Saline expanders
- Topical silicon sheeting

- Hypertrophic scar
- Pruritis

DIFFERENCES BETWEEN HYPERTROPHIC SCAR AND KELOID

	Hypertrophic scar	Keloid
o Relationship with the original wound	Rises above the skin level but stays within the border of the original wound	Rises above the skin level, extends beyond the confines of the original wound
o Regression	Regress over time	Rare spontaneous regression
o Familial	Non familial	Familial
o Race	Not race related	More in Africans
o Sex	Men and women are equally affected	Women > men
o Age group	Children	10- 30 years age
o Site	Areas of tension and flexor surfaces	Sternum, face, shoulder, ear lobe
o Cause	Related to tension	Unknown
o Histology	Collagen bundles are flatter and in a wavy pattern	Collagen bundles arranged haphazardly and are larger and thicker
o Immune system	Higher T lymphocytes and Langerhans cell	ANA against fibroblast , endo and epithelial cells

❖ CAUSES OF DEATH IN BURNS

- Asphyxia
- Shock due to hypovolemia or septicaemia
- Bronchopneumonia
- Septicaemia
- Exhaustion due to extensive burns
- Rare causes – gangrene, tetanus etc.

SPECIAL TYPES OF BURNS [13,18,19,20,25]

❖ CHEMICAL BURNS

- In this type of burns tissue destruction is more
- It is always deep burns
- Types are acid burns and alkali burns

➢ Acid burns

- It occurs in GIT, skin and soft tissues
- It is common in stomach among GIT either due to nitric acid or sulphuric acid which leads to gastritis and pyloric stenosis.
- Acids cause metabolic acidosis, ARDS, renal failure and haemolysis.
- Acidemia should be corrected by IV sodium bicarbonate.

➢ Alkali burns

- It occurs in oral cavity and oesophagus .
- Alkali burns in oesophagus causes multiple oesophageal strictures
- Commonly involved alkalis are sodium hydroxide, potassium hydroxide, lime and bleach.
- They cause saponification of fat, fluid loss, release of hydroxide ions which are toxic to cells.
- External chemical burns are always deep and they can cause considerable disfigurement.
- Initial treatment is dilution with clear water.

- Neutralization with antidote should never be done at initial management because it causes exothermic reaction which aggravates the further tissue damage.
- Later neutralisation can be done with 0.2% acetic acid in alkali burns and sodium bicarbonate in acid burns.
- Treatment
    - Mannitol diuresis
    - Haemodialysis if needed
    - Analgesics
    - Fluid and electrolyte management
    - TPN
    - Ventilator support if needed

❖ INHALATION INJURY

- It occurs due to
    - ➢ Inhalation of heat
    - ➢ Noxious gases
    - ➢ Products of combustion
- At the incident site, if oxygen concentration is less, death can occur due to hypoxia.

- Inhaled CO can bind with haemoglobin in blood to form carboxyhaemoglobin causing severe anoxia and death.
- Symptoms are
    - Disorientation and altered sensorium
    - Severe headache
    - Weakness
    - Visual disturbances
    - Hallucination
    - Shock
    - Laryngeal and bronchial oedema and finally spasm
    - Cardiac arrest
- Late complications
    - Shock lung or Acute respiratory distress syndrome
    - Pulmonary oedema
    - Aspiration Pneumonia
    - Atelectasis
    - Pulmonary embolism
- Clinical findings
    - ABG-Low oxygen saturation
    - Charring of mouth, oropharynx on bronchoscopic examination
    - Carbon sputum

- Singed nasal and facial hair
- Altered mental status
- Noisy breathing and dyspnoea

- Treatment
  - Replace the patient from the fire site
  - IV antibiotics
  - Nasal oxygen therapy
  - Ventilator support if necessary
  - Bronchoscopy to confirm
  - Trecheostomy if required

❖ **ELECTRICAL BURNS**

- Two types are
  - High tension injury
  - Low tension injury

- Electrical injury always causes deep burns.
- Patient will have a wound of entry and wound of exit.
- Victim may also have severe internal organ injuries.
- Patient may develop convulsions.
- Death can occur due to cardiac arrhythmias like ventricular fibrillation.
- Renal tubular damage and renal failure can occur due to myoglobin release from muscles.

- Metabolic acidosis is common in electrical burns so patient often require bicarbonate infusion after confirmation by arterial blood gas analysis.
- Orthopaedic problems like Fractures and dislocations can occur and are treated accordingly.
- Investigations
    - Electro Cardiogram and cardiac monitoring
    - Chest X ray
    - Ultrasound abdomen
    - Computerised Tomography - Brain
    - Cardiac enzyme analysis by electrophoresis
- Treatment
    - Wound excision and debridement
    - Amputation of limbs
    - Surgery for visceral injuries if necessary

TOPICAL ANTIBIOTIC THERAPY [25,26,28,29,32,33,35,37]

- The most common cause of death in burns is sepsis.
- Topical chemotherapeutic agents are applied
  - To limit excessive bacterial growth in the wound.
  - To prevent systemic sepsis.
  - To prevent destruction of viable tissue by progressive infection.
- **Ideal Topical Antimicrobial properties are**

- It should have properly targeted antimicrobial spectrum for the particular type of infected wound.
- It should have rapid bactericidal activity.
- It should have persistent or residual skin activity, allowing infrequent dosing.
- It should have activity in the presence of body fluids and wound exudates.
- Low likelihood of inducing bacterial resistance.
- It should have local skin penetration .
- It should not have systemic absorption.
- It should not produce toxic or allergic reactions to host tissue.
- It should be Cost effective.

Advantages

- High and sustained concentration of antimicrobial at the site of infection.

- Total amount of drug needed will be less .
- Limited potential for systemic absorption and toxicity.
- May help to reduce the use of systemic antibiotics.
- Reducing development of antibiotic resistance.
- It directs attention of patient to the wound.
- It can be applied as outpatient, by patient or caregiver, thereby reducing the need for institutional care.

Disadvantages

- Only few effective agents have been proved by clinical trials.
- Minimal penetration limits its use in open wounds without cellulitis or deep soft-tissue spread of infection.
- Systemic absorption of some agents may occur.
- Large size wounds.
- Some agents cause local hypersensitivity reactions or contact dermatitis.
- May interfere with wound healing processes.
- It may cause possible alteration of normal cutaneous flora.
- Difficult to calculate accurate dose.
- Frequent reapplications may be needed.
- Sometime it may be difficult to apply or aesthetically unacceptable to some patients.

➢ **Commonly used topical agents in burns**

- Silver sulphadiazine1%

- Mafenide
- Silver nitrate solution 0.5 %
- Nitrofurazone 0.2%

Drugs used in this study are

- **Silver sulfadiazine**
- **Placental extract**

SULFONAMIDES [38,39,40,41]

- The original antibacterial sulphonamides are synthetic antimicrobial agents that contain the **sulfonamide group**.
- This group of drugs are able to interfere in normal cellular metabolism. Hence they are called antimetabolites.
- Basically these drugs are bacteriostatic.
- MOA: They are competitive inhibitors of folate synthase enzyme involved in folic acid synthesis metabolism.
- Since they are competitive inhibitors ,inhibition is depend on the concentration of drug .
- Hence inhibition can be reversible.
- These drugs are selectively toxic to the bacteria and not to mammalian cells.
- Because mammalian cells don't produce folic acid. These cells use folic acid in diet .

Drug classification

❖ Oral agents

Short acting drugs	Intermediate acting drugs	Long acting drugs
Sulfadiazine Sulfamethiazole Sulfisoxazole	Sulfamethoxazole	Sulfadoxime

- ❖ Drugs used in GIT
  - o Sulfasalazine
  - o Olsalazine
- ❖ Topical use
  - o Silver sulfadiazine
  - o Sulfacetamide
  - o Mafenide

Common uses

- o Sulfacetamide used in ocular infections.
- o SSD and Mafenide routinely used in burn patients.
- o Sulfasalazine used in ulcerative colitis.

Common adverse effects

- o Hypersensitivity induced skin rash – most common .

- In HIV patients they can cause granulocytopenia and aplastic anaemia.
- In G-6-PD deficiency patients these drugs can cause acute haemolysis.
- These drugs precipitate in acid ph of urine results in hematuria and crystalluria.
- Drowsiness and confusion
- Steven- Johnson syndrome

Metabolism

- These drugs are metabolised in liver by acetylation.

Precautions

- Liver failure
- Renal failure
- In case of prolonged use

Drug interactions

- These drugs are ineffective when pus is present.
- Because pus large amount of Para amino benzoic acid which is competitive indicator of sulphonamide group of drugs.

Contraindication

Pregnant women

ADVANTAGES OF SILVER DRESSINGS

- Release pure silver that is nontoxic to tissue.
- Release silver over days in antimicrobial quantities.
- Decrease mechanical trauma to the wound with no need for frequent dressing changes.
- Maintain moist wound healing.
- Silver ions exert immediate action against microorganisms and kill them by blocking their respiratory enzyme system.
- Silver ions also have Pro- healing property by blocking matrix metalloproteinase activity.

PLACENTA [42 – 50]

Derived from the Latin word meaning “flat cake”. In general refers to as “afterbirth”.

Placenta contains

- Over 128 rich growth factors(including HGF, NGF, EGF, IL2, IL3 IL4)
- Bioactive cytokines
- Antibodies
- Amino acids(valine, leucine and lysine)
- Glycosaminoglycans
- Nucleic acids
- Hormones
- Polydeoxy ribo nucleotides
- Vitamins such as B2,B6,B12,folic acid
- Minerals

Placental extract

- Placental preparations classified into
  - Aqueous extract
  - Hydroalcoholic extract

- The contents of the extract depends on the methods of preparation
- Placentrex used in this study prepared in the following way

    - Fresh placenta stored in ice were tested initially for HIV antibody later for hepatitis surface antigen
    - Single cold and hot aqueous extractions were done at 6 and 90^0c respectively
    - Followed which sterilization done
    - It was filtered under aseptic condition and benzyl alcohol was added upto1.5% as preservative followed which sterilization done once again
    - Each ml of extract was derived from 0.1 gram of fresh placenta
    - A single batch was prepared from a single pool of several placenta

BENEFITS OF PLACENTAL EXTRACT

- Anti aging
- Wound healing
- Boosting immune system
- Mental alertness
- Stamina
- Vision improvement

- Regulating hormonal imbalances
- Improving the overall physical activity

Mechanism of placecental extract in wound healing

- Human fibronectin type III like peptide (peptide 7.2 kDa) found in placenta promote wound healing in the following ways
    - It can mediate Cell adhesion
    - Cell migration
    - Augment integrin signalling and induce expression of collagenase
- The nucleotides
    - Increases tissue regeneration effect through protein synthesis.
- NADPH – Important factor for synthesis of Nitric Oxide
- Nitric oxide causes
    - Angiogenesis
    - Vasodilatation thereby improves tissue perfusion and facilitates the process of wound healing.

- Antibacterial action

  - Placental extract induces production of interferon – γ by macrophages.
  - Interferon –γ plays a major role in innate immunity and in inflammation.
  - Placental extract increases IgG and IgM antibodies and total lymphokines .
  - Both IgG and IgM activate the complement system which in turn produce specific antibodies thereby neutralise viruses and bacteria's.

- Regulation of protease activity

  - Proteases regulate the balance between tissue degradation and regeneration. So regulation of proteolysis activity is therefore critical for efficient wound repair.
  - Placental extract regulates proteolysis activity of certain proteases involved in healing.
  - It stabilises some proteolysis enzymes against their auto digestion and enhancing their efficacy in wound healing.

- Anti – inflammatory properties

  - Placental extract has anti –platelet aggregation activity, which is an important marker of inflammation.
  - Placental extract inhibit chemical mediators involved in inflammation.
  - Placental extract modulate the prostaglandin production, thereby inhibit the platelet aggregation.
  - Placental extract also inhibit the serotonin release from the mast cells, is responsible for increase in vascular permeability during inflammation.

- Collagen synthesis

  - Placental extract increases hydroxyproline synthesis which is responsible for collagen formation.

Possible side effects

- Stinging sensations,
- Burning sensations
- Atrophy.
- Signs of a reaction include difficulty in breathing, swelling, skin rashes, ect

Precautions

- Any allergies

- Pregnant or breastfeeding
- Taking any other medication
- Any existing or past medical conditions which may relate to the condition being treated or interfere with this medication.

AIM OF THE STUDY

The aim of the study is to analyse and compare placental extract and silver sulfadiazine application in 20 -40% fresh flame burns and scalds to compare the efficacy of both the drugs in

1. Wound healing.
2. Wound infection
3. Contracture
4. Hypertrophic scar
5. Better patient compliance
6. Cost effectiveness.

MATERIALS AND METHODS

STUDY POPULATION

The patient attending the emergency services and subsequent admission as in-patient (Age range of 13-70) with 20-40% fresh flame burns and scalds in CMCH .

STUDY PERIOD

September 2011 to November 2012

STUDY DESIGN

Randomised control prospective study

- Soon after the patients are admitted in the ward, detailed history taking will be followed in all the cases
- Patients with disease which delays wound healing like diabetes melitus, tuberculosis, anaemia, organ failure, immuno compromised status, and previous drug intake etc will be noted.
- Thorough clinical examination of the patients will be made and percentage of body surface area involved will be recorded according to the rule of 9. patients admitted with 20 – 40 % burns are randomised into two groups
- Both the groups were carefully selected to match as closely as possible for age, sex and burns surface area.

- In both the groups patients were treated after getting oral as well as written consent.
- In group I patients were treated with placental extract application along with fluid resuscitation and intravenous antibiotics. [protocol followed in CMCH]
- In group II patients were treated with silver sulfadiazine application along with fluid resuscitation and antibiotics.
- The burn wound is cleansed with saline and topical agent (placental extract or SSD) applied directly over the wound using sterile gauze in daily morning.
- During the treatment period the patients will be examined for
    - Healing of burn wound
    - Wound infection
    - Eschar formation
    - Wound contraction
    - Granulation tissue formation
    - Burning sensation on application of drug and
    - Wound status will be noted.
- Wound swab will be taken from the burn wound on the day of admission and 5^{th} day in the post admission period.

- After obtaining culture and sensitivity report patients were given antibiotics according to the report.
- 90% healing was chosen as our-endpoint as the healing of the rest of the wound to completion is generally variable and dependent upon other factors like age, depth and % of burns. After the patients are discharged from the Hospital regular follow-ups will be done for first two months.
- During the follow up period, the patients are examined for
  - Hypertrophic scar
  - Contracture

INCLUSION CRITERIA

- All patients age range of 13 – 70
- 20 – 40% burns
- Flame burns and scalds
- First and second degree burns
- <24 hrs time interval between incident and hospital admission of the patient.

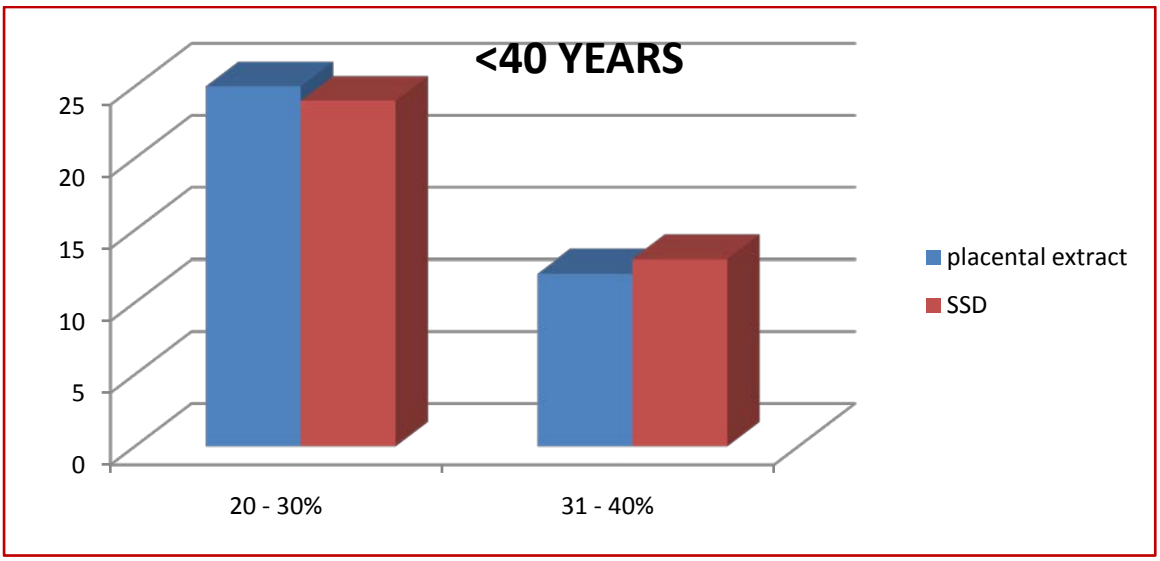
EXCLUSION CRITERIA

- Any patients less than 13 years and greater than 70 years of age.
- Patients having burns other than flame burns and scalds.
- >24 hrs of time interval between incident and hospital admission.

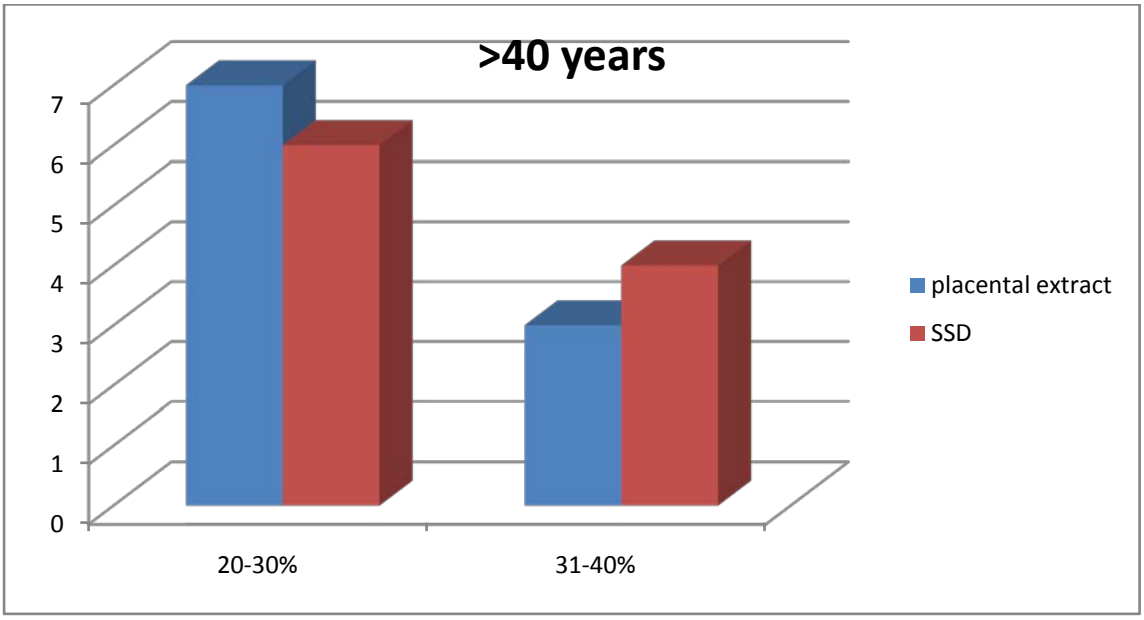
- Patients with disease which delays wound healing like Diabetes Mellitus, Tuberculosis, Leprosy, Anaemia; Immuno compromised status, Organ failure and chronic drug intake.
- Death of the patient during study period.
- **OBSERVATION AND RESULTS**

I.PATIENT CHARECTERISTICS

AGE % BURNS		PLACENTAL EXTRACT	SSD
BELOW 40YRS	20-30%	25 [53%]	24 [51%]
	31-40%	12 [26%]	13 [28%]
ABOVE 40YRS	20-30%	7 [15%]	6 [13%]
	31-40%	3 [6%]	4 [8%]
	Total	47[100%]	47 [100%]

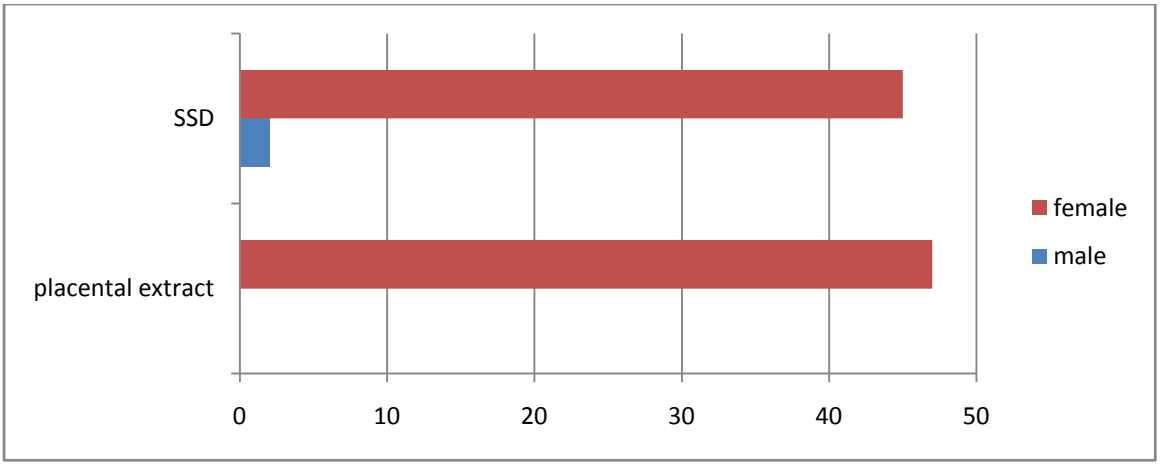


In this study patients with 20 – 30% burns are more in number than patients with 30 – 40 % burns



Sex distribution

GROUP	MALE	FEMALE	TOTAL
PLACENTAL EXTRACT	0	47 [100%]	47 [100%]
SSD	2 [4.3%]	45 [95.7%]	47 [100%]



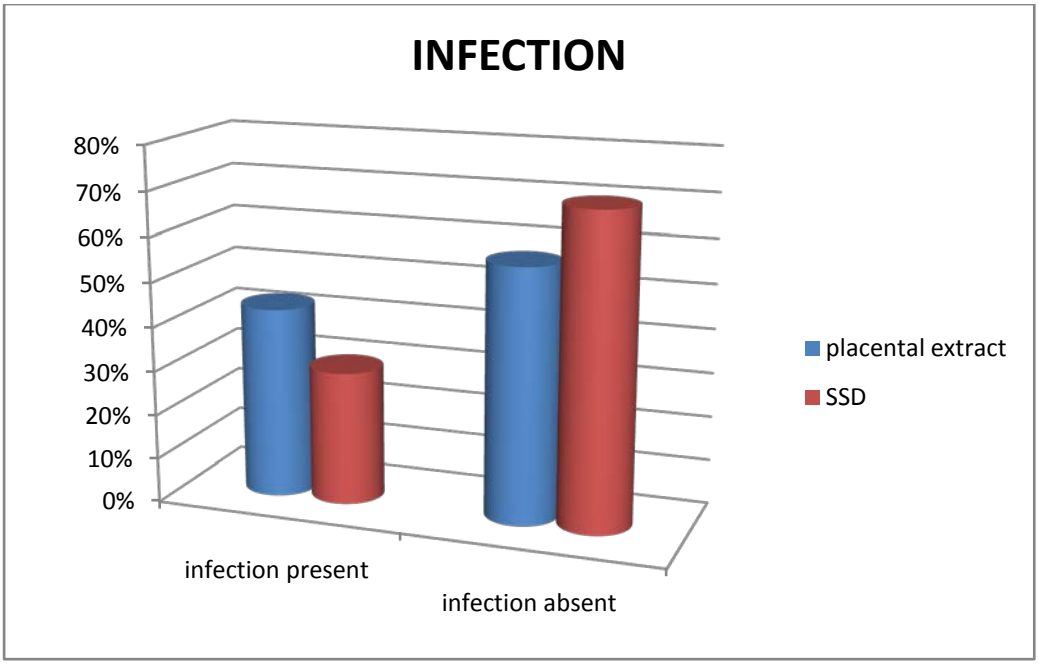
In this study female patients are more in number than males

II.INFECTION

GROUP	INFECTION PRESENT	INFECTION ABSENT	TOTAL
PLACENTAL EXTRACT	20 [43%]	27 [57%]	47 [100%]
SSD	14 [30%]	33 [70%]	47 [100%]

P = 0.1978

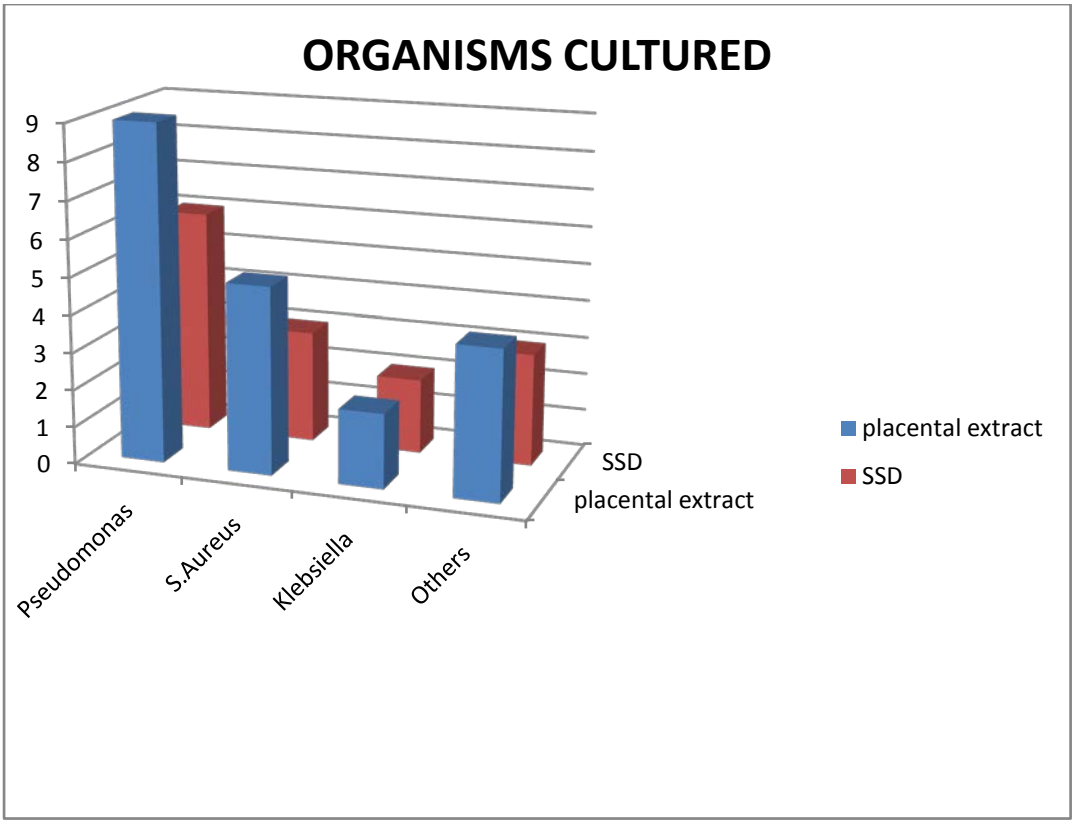
There is NO significant difference in both the groups



Though infection rate is more in placental extract group than in SSD, statistically it is insignificant

Distribution of infecting organisms

	Pseudomonas	**S. Aureus**	**Klebsiella**	**others**	**Total**
Placental extract	9(45%)	5(25%)	2(10%)	4(30%)	20 (100%)
SSD	6(43%)	3(21%)	2(14%)	3(22%)	14 (100%)



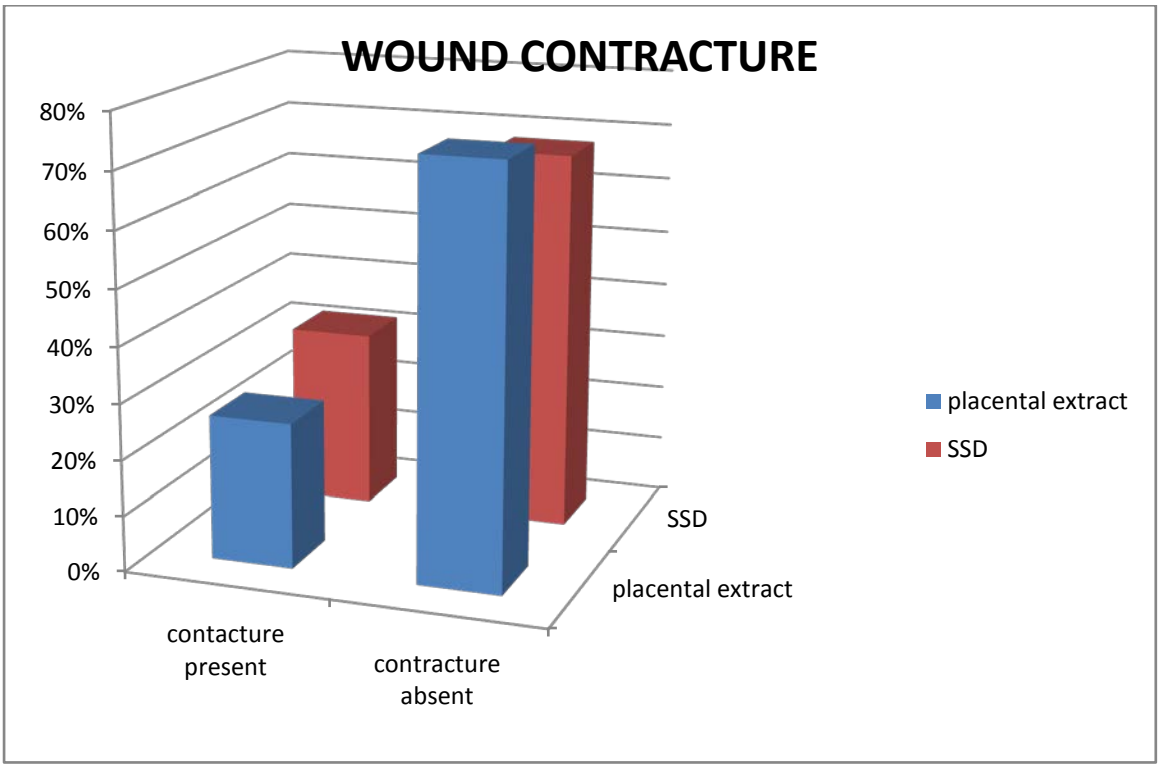
In both the groups Pseudomonas infection is common

III. WOUND CONTRACTURE

GROUP	PRESENT	ABSENT	TOTAL
PLACENTAL EXTRACT	12 [26%]	35 [74%]	47 [100%]
SSD	15 [32%]	32 [68%]	47 [100%]

P= 0.4941

There is no significant difference in both the groups

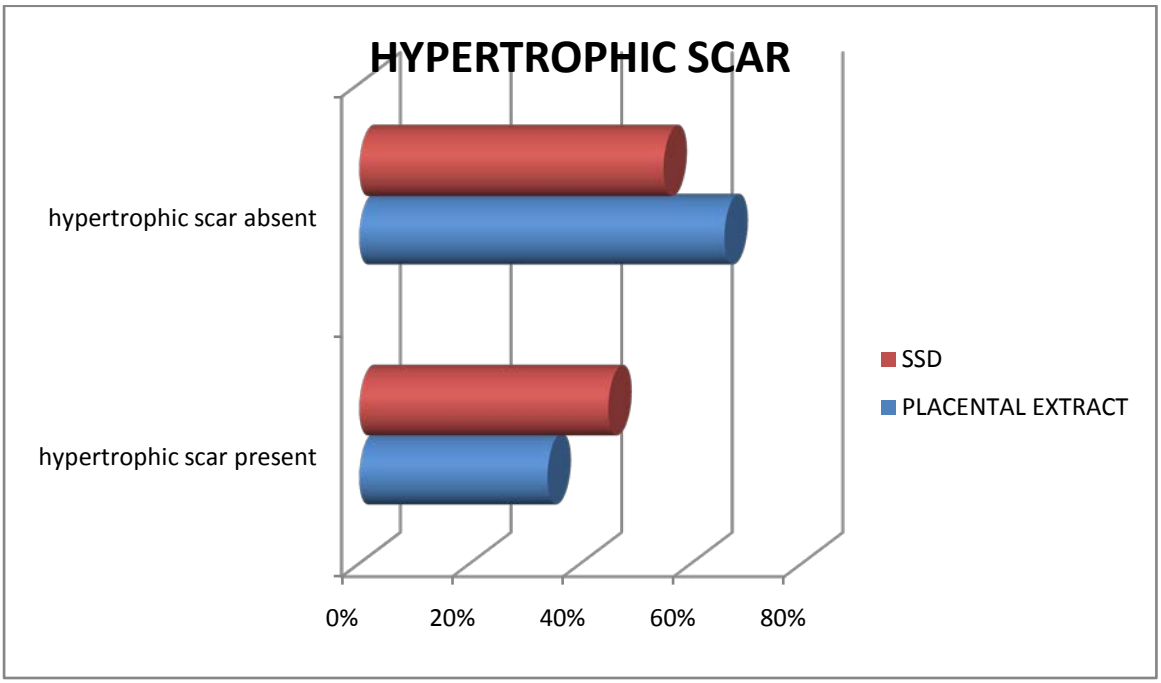


IV. HYPERTROPHIC SCAR

GROUP	PRESENT	ABSENT	TOTAL
PLACENTAL EXTRACT	16 [34%]	31[66%]	47 [100%]
SSD	21[45%]	26 [55%]	47 [100%]

P =0.2912

There is no significant difference in both the groups

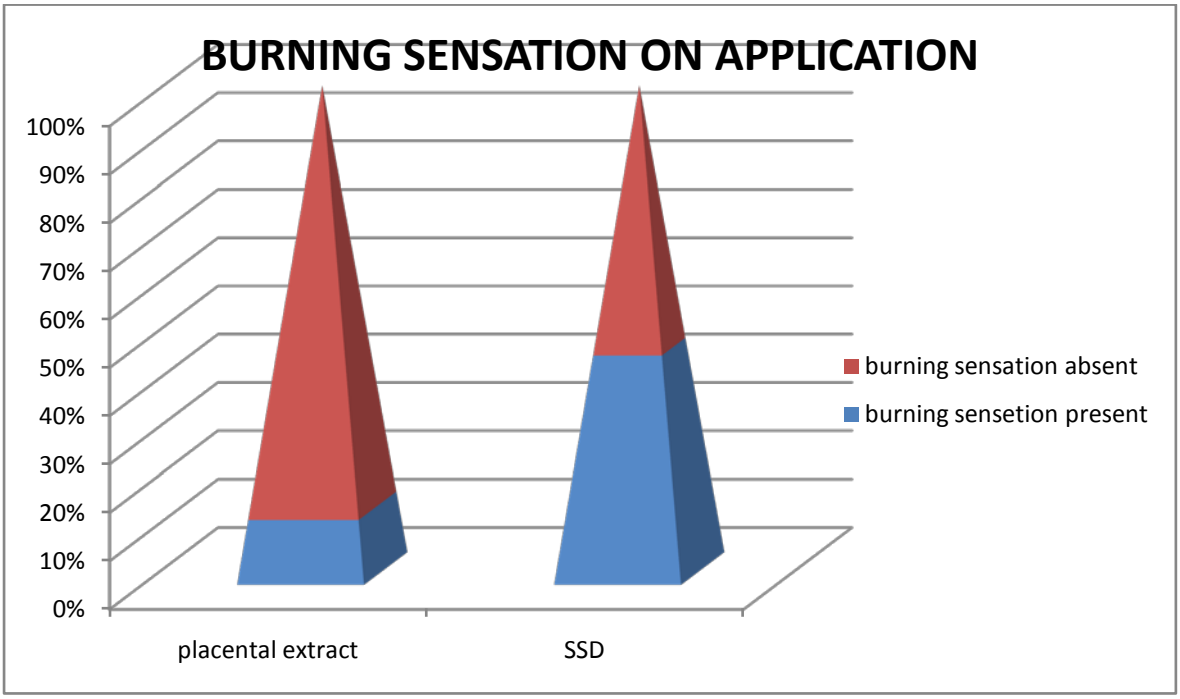


V. BURNING SENSATION ON APPLICATION OF DRUG

GROUP	PRESENT	ABSENT	TOTAL
PLACENTAL EXTRACT	6 [13%]	41[87%]	47 [100%]
SSD	14 [28%]	33 [72%]	47 [100%]

P = 0.0438

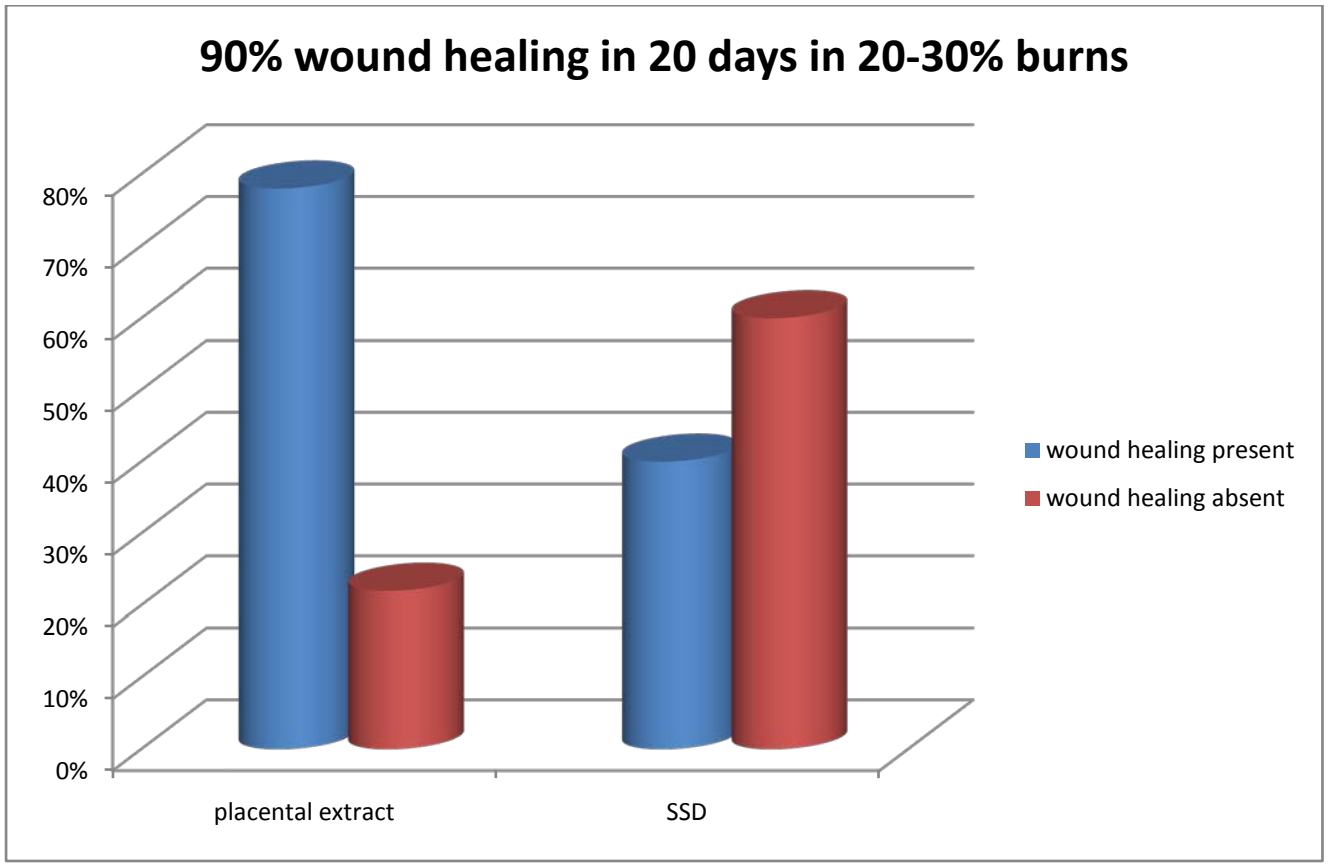
There is significant difference seen



VI. WOUND HEALING

90% OF WOUND HEALING IN 20 – 30% OF BURNS	PRESENT	ABSENT	TOTAL
PLACENTAL EXTRACT	25 [78%]	7 [22%]	32 [100%]
SSD	12 [40%]	18 [60%]	30 [100%]

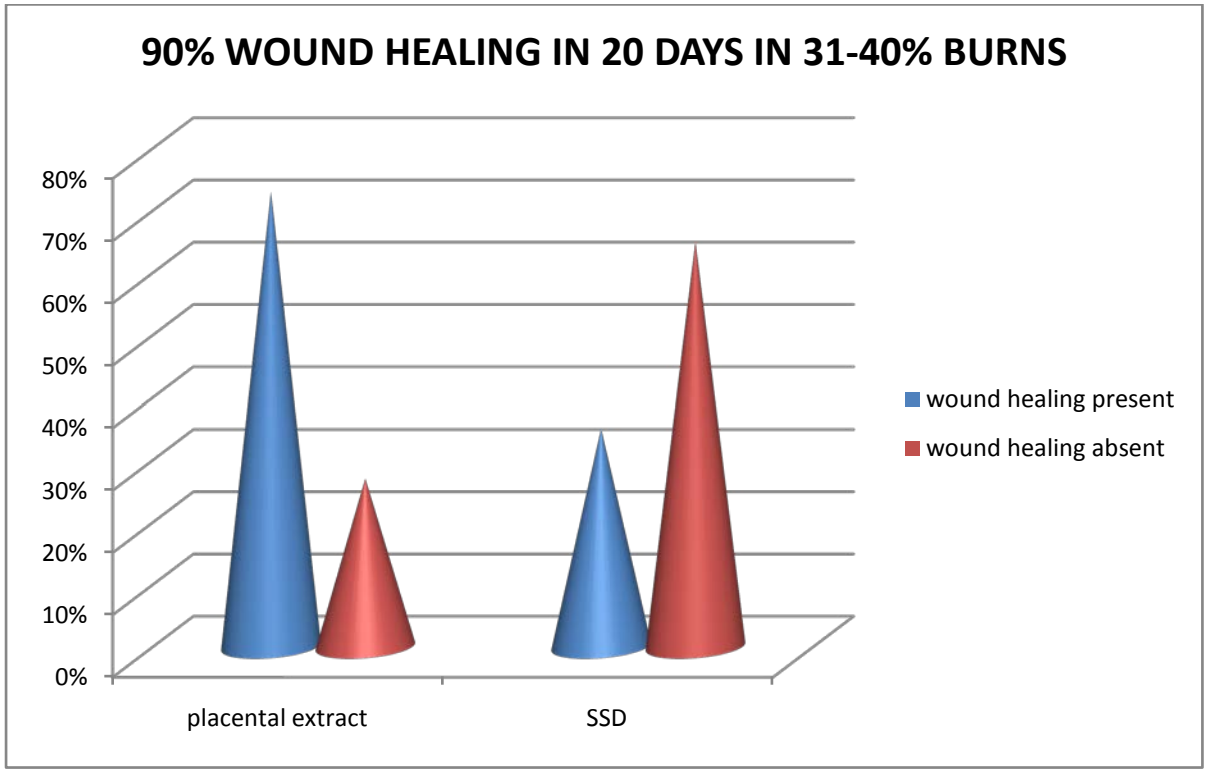
P = 0.0022



There is significant difference seen in both group

90% OF WOUND HEALING IN 20DAYS FOR 31-40%	PRESENT	ABSENT	TOTAL
PLACENTAL EXTRACT	11 [73%]	4 [27%]	15 [100%]
SSD	6 [35%]	11 [65%]	17 [100%]

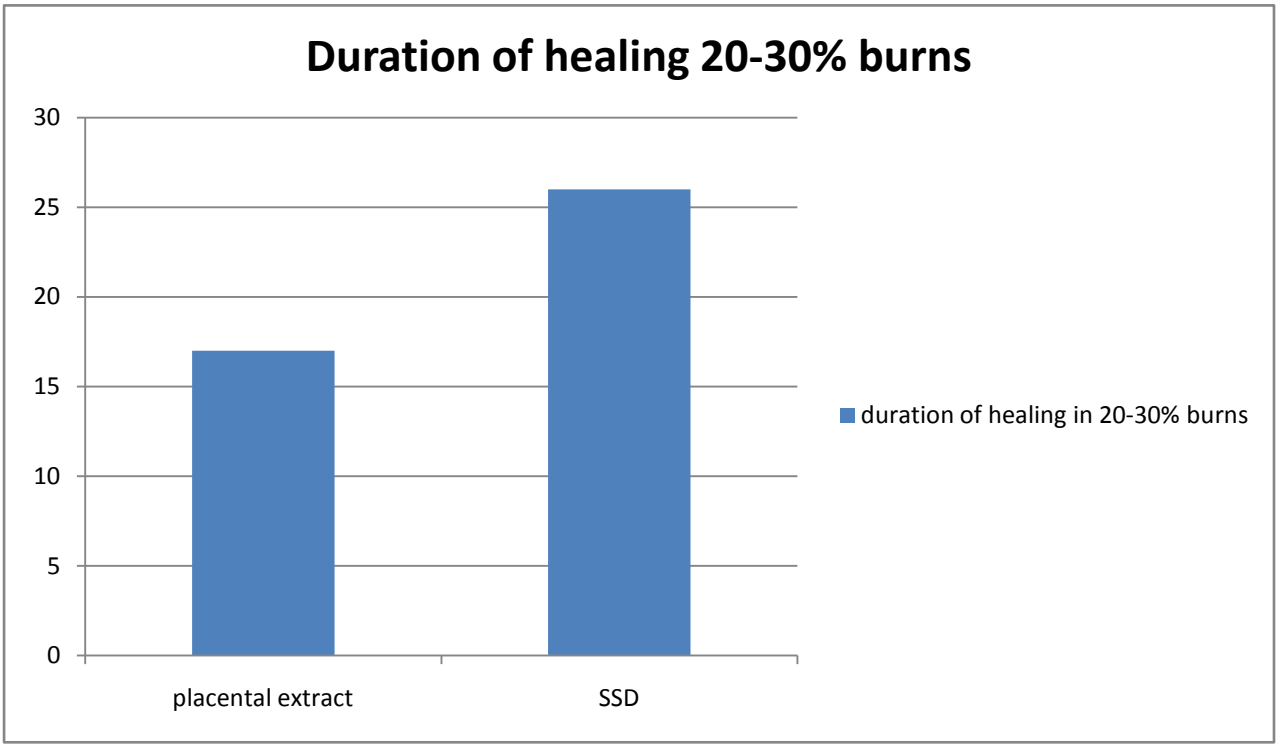
P = 0.0314

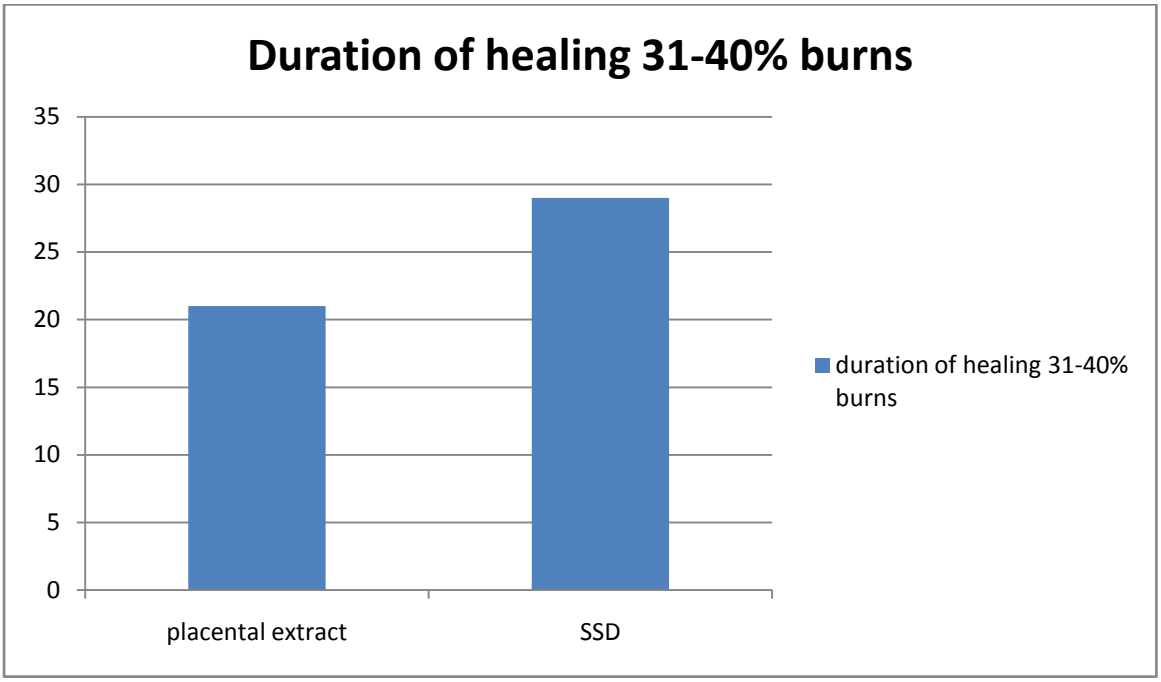


Significant difference noted in both groups

VII. DURATION OF HEALING

	GROUP	PLACENTAL EXTRACT	SSD
AVERAGE DURATION [DAYS]	20-30% BURNS	17 DAYS	26 DAYS
	31-40% BURNS	21 DAYS	29 DAYS


Duration of healing 20-30% burns
30
25
20
15
10
5
0
placental extract
SSD
duration of healing in 20-30% burns


Duration of healing 31-40% burns
35
30
25
20
15
10
5
0
placental extract
SSD
duration of healing 31-40% burns

VIII. COST EFFECTIVENESS

PLACENTAL EXTRACT:

- 10% burns needs 20gms of gel per day

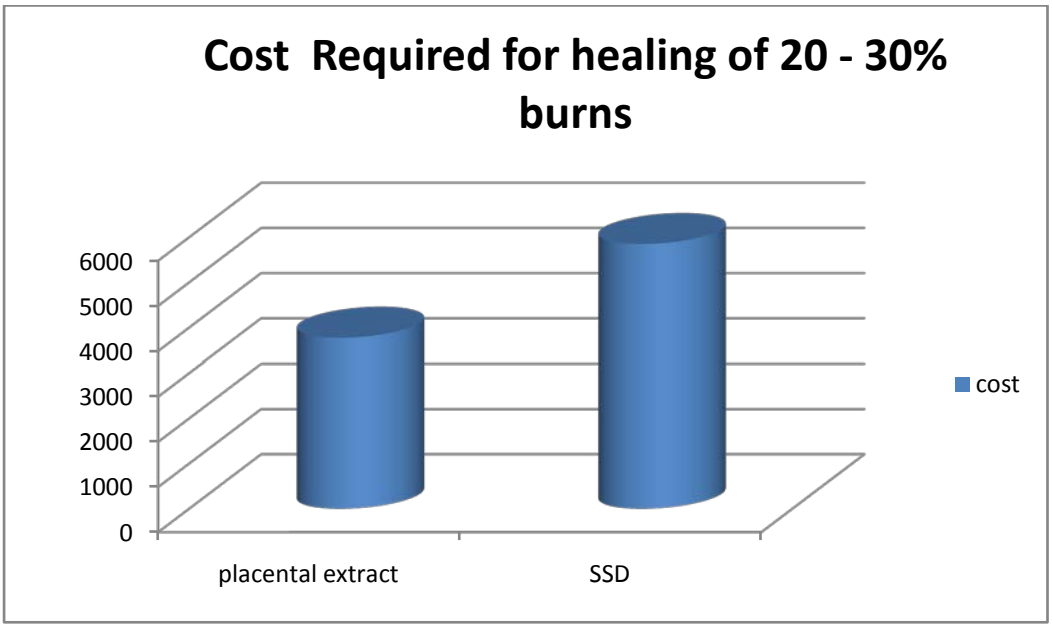
  For 20- 30% healing requires 17(days) x 60 gms

- Price 20gms= Rs.74
- So 17x [74 x 3]= About Rs. 3774/ -
- For 100 patients Rs.3,77,400
- For 31 – 40% = Rs. 6216 /-
- For 100 patients Rs.6,21,160

SSD

- 10% of burns needs 100gms of gel per day

- For 20 - 30% of healing requires 26(days) x 300gms
- Price 100gms= Rs.75
- So 26 x [75 x 3]= Rs.5850 /-
- For 100 patients Rs.5,85,500.
- For 31 – 40% = Rs. 8700/-
- For 100 patients Rs.8,70,000



Placental extract is cost effective

DISCUSSION

- Our study included of 94 cases of 20 – 40 % burns the burns were most commonly found in females and male to female ratio was 1:46 in our study population. Female predominance occurs due to

  1. The working atmosphere in kitchen .

  2. Involvement in dowry problems .

  3. Stressful life .

  4.Handling of combustible fuel and volatile gas. Kerosene can easily spill and is highly combustible. Accidents are possible while handling.

This is in concurrence with the following previous study-

Ashish K Jaiswal et al, Epidemiological and socio-cultural study of burn patients in M. Y. Hospital, Indore, India

- Burns were more commonly occurs in people <40 yrs. This is comparable with previous study

Ashish K Jaiswal et al, Epidemiological and socio-cultural study of burn patients in M. Y. Hospital, Indore, India

This is due to

- ❖ Most common complication of burns in our study population is wound infection, which occurred in 30 – 40 %.The most common causative organism was found to be pseudomonas followed by S.Aureus.
- ❖ This is comparable to the following study

Bacterial isolates from burn wound infections and their antibiograms: A eighty-year study, Manjula Mehta, Priya Dutta, Varsha Gupta et al

Molecular epidemiologic study of burn wound infection caused by Staphylococcus aureus in children, wu sx, liu yx et al.

The Epidemiology of Burn Wound Infections: Then and Now Robert A et al

- ❖ Complications were higher in the above 40 yrs age group in patients with higher % of burns in our study. This results correlates with Ashish K Jaiswal et al, Epidemiological and socio-cultural study of burn patients in M. Y. Hospital, Indore, India.
- ❖ We divided the study population randomly into two groups. One receiving placental extract and the other receiving silver sulfadiazine, matching regarding age and % of burns was done in each group .
- ❖ The infection pattern of the burns was studied by wound culture and sensitivity the cultures were taken on the day of admission and 5^{th} day, from which the organisms and sensitivity studied.

- Wound infection was found to slightly higher in the group receiving placental extract which was further higher in the patients coming under age group of >40 years.
- The statistical calculation was done using chi-square-test which showed no significant difference between the two drugs. This may show that though the placental extract is a drug for wound healing it may have antibacterial activity equivalent to silver sulfadiazine. The profile of organisms grown was similar in both the groups.
- Wound contractures slightly higher in silver sulfadiazine but it showed no statistical significance. Similarly there was no statistical significant difference between prevention of hypertrophic scar in both the groups. Thus the prevention of long term complications were not significantly different between either of the drugs this may be due to fact that development of hypertrophic scar and contracture may depend upon other factors like physiotherapy received and patients genetic profile.
- This may also be due to the fact that application of both the drugs was stopped once the epithelisation has occurred and the initial scar may progress to hypertrophic scar after the initial epithelisation.
- The major difference between two drugs was found in the patient compliance and wound healing.
- Burning sensation in patients treated with placental extract was significantly lower when compared to those who got silver sulfadiazine

this improved patient toleration of the drug and prevented discontinuation of the treatment.

- ❖ 20 days was kept as a cut-off point to study the difference in wound healing in both groups. Because more than 50% of patients had comprehensive wound healing within this time. This was in concurrence with various other studies in wound healing in burns patients.
- ❖ Wound healing was significantly higher in patients using placental extract in both 20 -30 % and 31 – 40 % burns .
- ❖ This is comparable to the study conducted by shukla et al, role of placental extract in wound healing.
- ❖ The number of patients who had 90% wound healing within this period were the most double in patients using placental extract when compared to those using silver sulfadiazine.
- ❖ The major point of consideration when comparing two treatment options is the cost effectiveness of the treatment .
- ❖ The cost of using placental extract for healing of 20 – 30 % burns was Rs-3774/- Which was significantly lower than when compared to silver sulfadiazine which came up to Rs 5850/, the gap was further increased when the % of burns increased.
- ❖ Thus placental extract is a cheaper and more effective treatment option in burns wound healing.

CONCLUSION

In this study of 94 patients with the following conclusions have been arrived

- Incidence is higher among females than males.
- The Peak incidence occurs in the age group of less than 40 years.
- Pseudomonas aeruginosa and staphylococcus were the most commonly incriminated organisms in burn wound infection.
- Placental extract has better patient compliance.
- Placental extract is cheaper and cost effective.
- Placental extract is effective in burns wound healing.
- Both silver sulfadiazine and placental extract are not effective against development of hypertrophic scar and contracture .
- Further studies may be required to know about the effect on preventing late complications in burns using placental extract.

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PROFORMA

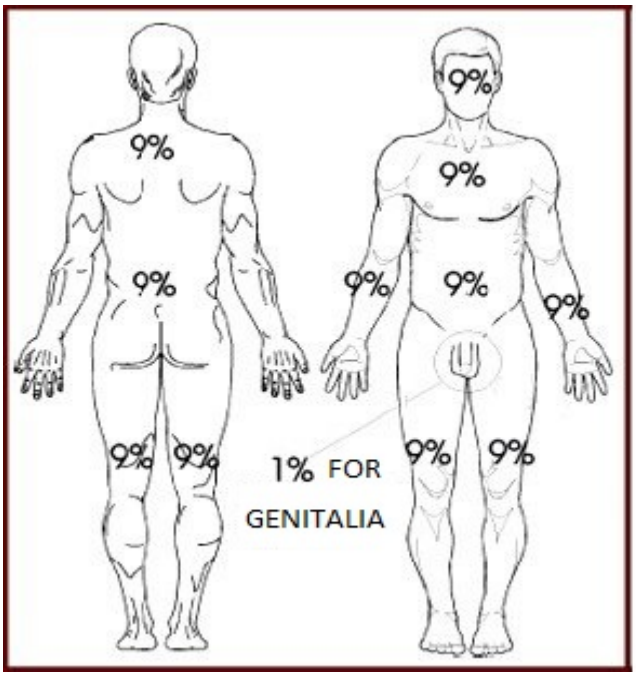
- **PATIENT PARTICULARS**
  - **Name**
  - **Age**
  - **Sex**
  - **In-Patient no**
  - **Address**
  - **Place and time of incidence**
  - **Type burns**
- **PAST HISTORY**
  - **DM/ HT/ TB/ Anemia/ BA/ Epileptic**
  - **Previous Drug intake**
  - **Any previous H/O Drug allergy**
- **PERSONAL HISTORY**
  - **Smoker/ Alcoholic**
- **MENSTRUAL HISTORY**
- **GENERAL EXAMINATION**
  - **Anemia**
  - **Jaundice**
  - **Pedal oedema**

- **Generalized lymphadenopathy**

➢ **SYSTEMIC EXAMINATION**

- **CVS**
- **RS**
- **ABDOMEN**
- **CNS**

➢ **% OF BURNS BY 'RULE OF NINE'**



➢ **PARKLAND'S FORMULA**

4 X % Burns X Total body weight

Half of the calculated fluid to be given in fisrst 8 hours

Rest of the fluid to be given in next 16 hours

➢ **INVESTIGATIONS**

- **Complete blood count**
- **Blood grouping and typing**
- **Blood sugar and urea**
- **Serum electrolytes**
- **Pregnancy test in all females of childbearing age.**
- **Arterial blood gas analysis**
- **Serum proteins**
- **ECG**
- **CXR**
- **Wound culture and sensitivity**

➢ **TREATMENT**

- **Intravenous fluids**

  1st 24 hrs – crystalloids

  24– 48 hrs – colloides

- **Antibiotics**
- **Topical drug application**

  Placental extract or SSD – immediately after admission and once in 24 hrs

➢ **OBSERVATION**

- **Wound healing**
- **Wound infection**

- **Burning sensation on application of drug**

➢ **FOLLOW UP**

Patient with 30% burns on admission

The same patient treated with placental extract

Patient with 35% burns on admission

The same patient - placental extract applied

Application of silver sulfadiazine


Flaps

Name	Age	IP NO	% Burns	Infection	Contractur	Hypertroph	Burning ser	90% HEALI	Duration of haeling(days)
HAVAMAI	44/F	57783	20%	P	N	N	N	P	20
SAROJA	45/F	7487	20%	N	N	N	N	P	14
GAMATHY	64/F	10625	20%	P	P	N	N	P	17
GOMATHI	66/F	20290	20%	P	N	N	P	N	18
REETHA	24/F	19377	20%	N	N	N	N	P	16
NISHA	24/F	19415	20%	N	N	N	N	P	19
NEELAVEN	24/F	38860	20%	N	N	N	N	P	15
UMA	35/F	39082	20%	P	N	N	N	P	18
'AGAYATI	16/F	51368	20%	N	N	N	N	P	16
AKILA BAI	36/F	52377	20%	N	P	P	N	P	17
ARIAMMA	65/F	8139	25%	P	N	P	P	P	19
NATHIYA	22/F	456	25%	N	N	N	N	P	15
AHIRA BA	26/F	15226	25%	N	N	N	N	P	18
REVATHI	25/F	23121	25%	N	N	N	N	P	17
USHA	23/F	36215	25%	N	N	N	N	P	16
OTHIMAN	38/F	36214	25%	P	N	P	N	N	17
HINNAMM	70/F	12652	30%	P	P	P	N	P	16
LAMATHA	70/F	20097	30%	P	N	N	N	P	17
SOBANA	16/F	227	30%	N	N	N	N	P	18
CHITRA	25/F	3363	30%	P	N	P	N	N	17
ARUPATH	27/F	10628	30%	N	N	N	N	P	17
BANU	27/F	14220	30%	N	P	P	N	N	16
MAMUTH	24/F	23139	30%	P	N	N	N	P	18
ADHAMAI	26/F	30158	30%	N	N	N	N	P	17
DHILSATH	28/F	3964	30%	N	N	N	N	P	17
LRASWATI	40/F	30467	30%	P	P	P	N	N	16
SIVAGAM	35/F	32800	30%	N	N	N	N	P	18
SAMSATH	25/F	34679	30%	N	N	N	N	P	17
NDIYAMM	40/F	35718	30%	P	N	N	N	P	16
APROJ	27/F	36060	30%	N	N	P	N	P	18
SASIKALA	31/F	36063	30%	N	P	P	P	P	17
LANDISELV	23/F	51352	30%	N	N	N	N	P	17
TEERATHA	61/F	40372	35%	P	N	N	N	P	22

AGALAKS	38/F	19173	35%	N	N	N	N	P	20
MANJULA	28/F	19250	35%	N	N	N	N	N	23
MALLIKA	40/F	38652	35%	P	P	N	N	P	19
USHA	47/F	17128	40%	P	N	P	N	P	21
SMABEEM	45/F	46632	40%	P	N	P	N	P	23
RANI	28/F	5673	40%	N	P	N	N	P	19
ASANTHA	28/F	28140	40%	N	N	N	N	P	21
AGAMMA	34/F	39370	40%	P	P	P	N	N	21
EPSIBHA	40/F	43465	40%	P	P	N	N	P	23
KAVITHA	24/F	45008	40%	N	N	N	N	P	19
AHESHWA	39/F	47476	40%	P	N	P	P	N	20
VANITHA	27/F	45225	40%	N	P	P	N	P	22
AMUDHA	21/F	67115	40%	N	P	N	P	N	21
PREETHI	27/F	68086	40%	P	N	P	N	N	21

NAME	AGE/ SEX	IP NO	% BURNS	INFECTION	CONTRACT	HYPERTRO	90% HEALI
PAPPATHY	65/F	22601	20%	P	N	P	P
NEELAMAI	45/F	26323	20%	P	N	N	P
ESWARI	45/F	27368	20%	N	P	P	N
SARANYA	19/F	4383	20%	N	N	N	P
DHANALAKS	35/F	24431	20%	N	P	P	N
BHUVNANEESH	23/F	25262	20%	N	N	N	P
NANDHIN	20/F	35352	20%	N	N	N	P
KANNAPPA	35/M	36231	20%	P	N	P	P
VIJAYALAKS	38/F	45179	20%	N	N	P	P
SATHYA	28/F	48377	20%	N	N	N	N
MYLATHA	60/F	50680	25%	P	N	N	P
AMMASA	65/F	50922	25%	P	N	N	N
SASIKALA	26/F	39362	25%	N	N	P	P
RAJAMAN	30/F	49349	25%	N	N	N	P
RAMATHA	35/F	43605	25%	N	N	P	P
ANITHA	34/F	47790	25%	N	N	P	P
ARUKKAN	46/F	46282	30%	P	N	P	P
SHAKILA	35/F	51373	30%	N	N	N	P
PANDIAMM	40/F	51087	30%	P	P	P	P
SUMATHY	24/F	55721	30%	N	N	N	P
JERINA BAI	29/F	58012	30%	N	N	N	P
RADHAMA	37/F	62083	30%	N	P	P	P
SNGEETH	24/F	64181	30%	N	N	N	P
USHA RAN	30/F	74345	30%	P	P	P	P
JESSE	30/F	3523	30%	N	P	P	P
GOKILA	17/F	1978	30%	N	N	N	P
NETHRAVA	26/F	28239	30%	N	N	N	P
THARA	34/F	35061	30%	P	P	P	P
PARVATH	25/F	35984	30%	N	P	P	N
ARTHI	20/F	45120	30%	N	N	N	P
SELVI	45/F	4547	35%	P	N	N	P
LAKSHMI	30/F	39683	35%	N	P	P	P
JAYALAKSH	26/F	12878	35%	N	N	N	P
KARTHICK	22/M	34639	35%	N	N	N	P
SAKTHI	25/F	49422	35%	N	N	P	N
AJMUNISH	58/F	56215	40%	N	P	P	P
ARULMAN	65/F	17942	40%	P	N	N	P
ARUKKAN	46/F	18131	40%	P	N	P	P
VANITHA	24/F	73977	40%	N	P	P	N
VANITHA	28/F	2660	40%	N	N	N	P
MUTHULAKS	16/F	13107	40%	N	N	P	N
GEETHA	25/F	14893	40%	N	P	P	P
KARTHIGA	28/F	20448	40%	N	P	P	N
SANGEETH	20/F	35194	40%	N	N	N	P
SUNITHA	35/F	36167	40%	P	N	P	P
REVATHI	35/F	42000	40%	N	P	P	N

LATHA	33/F	42109	40%	P	P	P	N

DURATION OF HEALING IN DAYS

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